	Yes	No	Comments	Response
Question 1: **Do you agree with the definitions included in the SAR?**	10	26		
Allen Chang, BCTC	1		No comment	
Everett Ernst, OG&E Electric Services	1		No comment	
Jim Cyrulewski, International Transmission Company	1		No comment	
Kevin B. Perry, Southwest Power Pool	1		No comment	
Mark A. Creech, Tennessee Valley Authority	1		No comment	
Richard Kinas, OUC	1		No comment	
Keith Comeaux, CLECO Power	1		Responsible Entity, we would like to see clarification on this point. Today we would see it as the Control Area and in the future stemming from the Reliability model functions. If this is correct we would suggest making the language change for implementation to reflect that and make a change to the definition when the model is implemented.	Definition has been modified.
Bill Wagner, Calpine	1		The standard requirements are a bit vague around reliability issues. Is this a reliability standard or a security standard? Consider enhancing the first sentence (or adding a new first sentence) to emphatically state the objective of the SAR as stated in the last sentence of paragraph 4, e.g., "The intent of this standard is to focus on the basic requirements to prevent and/or minimize impact to generation and transmission of electricity through malicious and/or unethical tampering of computer based communications, control, monitoring, and protection systems".	Detailed description has been modifed as suggested.
Keith Fowler, LG&E Energy Corp.	1		We feel the definitions in the current SAR are adequate and do not necessitate an unreasonable amount of company specific interpretation regarding scope.	
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	1		YES, however, we need clarification on the meaning of "bulk electric system functions" and of "power plant control". Does "bulk electric system functions" mean "functions related to the high voltage electric system" or does it mean "a lot of electric system functions"? Does "power plant control" mean plant Distributed Control Systems (DCS's) or the Energy Management Systems (EMS's) that perform automatic generation control (AGC) functions?	A definition of Bulk Electric System Asset has been added to help clarify how an entity narrows the list of assets to which this standard will apply. Through the modifications of the definitions, we feel we have clarified that power plant control is separate from AGC.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	No comment	
Alan Boesch, Nebraska Public Power District		1	The Critical Cyber Assets definition is too broad. The criticality of the cyber assets will vary with location and how they are used. For example, substation automation at a rural 115 kV substation may not be critical to the reliability of the interconnected system. Similarly the loss of a special protection system may not be critical to the reliability of the Eastern Interconnection. In addition, depending upon the use of data in inter-utility data exchanges, that link may not be critical to the real-time operation of the power system. These systems should not all be subject to the same requirements.	This definition has been modified, along with the addition of a definition for "Bulk Electric System Asset".
Alan Johnson, Mirant Corporation		1	Think that a couple of the definitions are still too vague. They leave too much open to interpretation. For example, under the definition of Critical Cyber Assets, what entity determines whether the loss of a Cyber Asset could adversely impact the reliability of bulk system operations? Is it the RA, or does the RA have to accept the determination of each entity? Regarding the definition of "Cyber Asset", believe that either a definition of "bulk electric system" or a reference to a source of the definition should be included. In addition, wondering why the definition applies only to systems or devices that use a network protocol stack for communications? Assume this is in reference to using TCP/IP to communicate over the internet. Don't non-internet communication methods need to be secured as well?	Definitions have been modified.
Cory Cipra,- Burns & MCDonnell		1	The statement "This definition applies only to systems or devices that use a protocol stack for communications" should be removed. Second, the definitions also include the applicability only to those assets that are "associated with bulk electric system operation." It is recommended that the definitions exclude the word "bulk" as to expand applicability to those entities (distribution) and other assets effecting not only bulk electricity but the equally important downstream entities that are present.	This definition has been modified.

	Yes	No	Comments	Response

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Question 1: **Do you agree with the definitions included in the SAR?**	10	26		
Gerald Rheault, Manitoba Hydro		1	Cyber assets: Must include regional and area control centres as per Urgent Action Cyber Security Standard implementation regardless of the technology used within those control centres. In the second sentence of this definition the words "network protocol stack" should be changed to "network layer protocol".Agree with the intent of the second sentence to limit, at this time, the scope of the proposed cyber security to externally vulnerable networks. However, physical barriers to external access, such as isolated organization-owned and operated communications systems and networks, should provide compliance with the proposed cyber security standard. All the above comments would be better included in the detailed description rather than in this definition. This would permit a clearer definition and allow a separate implementation program which could be revised in the future without changing the basic definition of cyber asset. Critical Cyber Assets:There should be direction given to the standards drafting team to clarify by definition or reference to other NERC documents what is included in "…impact the reliability of the reliability of the bulk electric system." i.e. networked 110 kV lines, generators greater than xx MW, etc. The responsible entity should determine their list of critical assets of the bulk electric system subject to review by the reliability region. "Black start" would be better described by "black start capability". "Voltage stability" should be included in the list of functions. Remote access must be included in the scope of the proposed cyber security standard. Security incident:Reporting events of "unknown origin" will result in numerous and perhaps needless reports for systems including communication systems provided by other suppliers or systems in remote locations which take considerable time to investigate. "Unknown origin" events resulting in a functional loss to a bulk electric system component will be reported via a normal operations report.	The definitions of cyber assets and critical cyber assets have been modified and a definition of Bulk Electric System Assets has been added. The statement regarding a company-owned network being compliant with the standard is accurate as long as the network is truly a separate, company owned and operated network and is separate from public access. We are referring to the function of black start and those cyber assets that support that function. Voltage Stability is addressed under control functions. Remote Access has been identified as dial-up access and has been included. The defintion of a security incident has been modified.
Grant McDonald, Allegheny Energy Group Representative		1	Cyber Assets/Critical Cyber Assets: A definition needs to be provided for "bulk electric system operation". Also, suggest modifying the last sentence under Critical Cyber Assets to read "should be considered at a minimum" instead of "are included at a minimum". There could be Cyber Assets that perform these functions that do not impact the reliability of bulk electric system operations. Each utility should have the responsibility to identify it's own Critical Cyber Assets.	A definition of bulk electric system assets has been added. Industry concensus supports more clarity of definitions. The phrase "should be considered" may be open to interpretation.
Jack Hobbick, Consumers Energy		1	Needs more clarification of what was intended, recommend that focus should be on the cyber assets that impact the most critical or greatest number of physical assets. Also the concept of defense in depth should be considered to build layers of security and allow entities to utilize their resources in proportion to the perceived risk. Consideration should be given to levels of criticality that would allow for different levels of security based on the risk.Also, the definition list should be expanded to include many more of the terms used in the scope such as Special Protection Systems, Communication Network, Market systems, etc The last sentence of critical cyber assets should state "should be considered at a minimum"	Definitions have been modified. Specific issues such as defense in depth or criticalness of assets should be addressed in the standard, not the SAR. The standard drafting team will be asked to expand the list of definitions and that NERC should be asked to develop a standard glossary of terms.
Jim Hiebert, WECC EMSWG		1	The definition of 'Cyber Assets' needs futher clairification. The definition seems somewhat vague.	The definition has been modified.
Joe Weiss, KEMA		1	The Cyber Assets definition states: "This definition applies only to systems or devices that use a network stack protocol for communications." This statement needs to be deleted. Cyber assets are not dependent on specific communication protocols. Cyber assets associated with bulk electric system operation utilize non-network stack (non TCP/IP) protocols such as Modbus, Profibus, and conventional serial RTU communications. Additionally, dial-up modems and unsecured radio links are obviously cyber vulnerabilities and do not use network stack protocols.The Security Incident definition states: "…any physical or cyber event of malicious or unknown origin…" This is not inclusive enough. There can be cyber events of known, benign origins that can disrupt functional operation of critical cyber assets and cause security incidents. There have been several confirmed cases of benign origin causing denial of service in the utility and other process industries.	The definitions have been modified. While the drafting team agrees with the comment regarding additional communication protocols, the protocols listed in the comment are not excluded from the standard. An entity may choose to include these protocols in its cyber security program. This SAR requests the development of a standard that addresses the MINIMUM requirements. Due to the costs associated, complexity of implementation, availability of technology, and the risks associated, other communications protocols are not being adderssed at this time. It is the goal of this proposed standard to address cyber security and any compromise of that security. Benign incidents may certainly be reported through the NERC IAW program, but are not required by this standard.
John G. Maguire, PJM Interconnection, LLC		1	Security Incident: Even if the origin is not "malicious or unknown", and even if it does not have a security impact, it should be handled through proper incident response. Every incident (especially cyber) should be responded to, as due diligence to verify the integrity of the infrastructure. The term "Security Incident" should be removed, and replaced by just "Incident"; and updated as described above. Cyber Assets: The line "This definition applies only to systems or devices that use a network protocol stack for communications" should be removed. There is little prescription for implementing cyber security in the Urgent Action Standard; and to be an industry standard, it is unlikely the permanent standard would pass if it was overly prescriptive; thus, applying cyber security management processes to every asset must be enforced. In addition, network security should not be the limit to the definition's scope. Assuming that devices with non-standard communication protocols need not comply, is exactly the opposite of what is necessary… Devices using	Definitions have been modified.
John Horakh , MAAC		1	The definitions have been significantly improved over those in the Version 1 SAR. The definition of Critical Cyber Assets as a subset of Cyber Assets is a good idea. However, the first sentence of the Critical Cyber Assets definition needs some words added. It should read "Critical Cyber Assets: Cyber Assets whose loss or compromise could adversely impact, to an unacceptable degree, the reliability of bulk electric system operations". It is likely that the loss of all (or almost all) of the Cyber Assets could adversely affect the reliability of the system, to a lesser or greater degree. The Critical Cyber Assets are only those that adversely affect the reliability of the system to an unacceptable degree.	Definitions have been modified.
John Lim, Con Edison		1	The definition of "Security Incident" is too broad. Change "unknown" to "suspected malicious"	The definition has been modified.
Karl Tammer, ISO/RTO Council - Standards Review Committee			No comment	
Kathleen Goodman, ISO-NE		1	Cyber Assets: Delete the sentence, "This definition applies only to systems or devices that use a network protocol stack for communications." As it is unnecessarily detailed and limiting. Security Incident: Change to read as, "Any physical or cyber event of malicious or suspected to be malicious origin that disrupts the functional operation of a critical cyber asset or compromises the electronic or physical security perimeters."	Definitions have been modified.

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Question 1: **Do you agree with the definitions included in the SAR?**	10	26		
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	The revised definitions substantially increase the scope and may cause significant cost to society without commensurate benefit. UAS 1200 and this SAR set a tone that assets either could or could not "adversely impact the reliability of bulk electric operations" with very little room for any measured approach to security. For example, a security breach to one substation that only affects that substation has a much smaller probability of adverse impact when compared to breaching the substation in a way that could disable an entire EMS system. Unfortunately, the definitions seem to direct the same security standard to both possibilities because either event "could" and because substations are "included at a minimum." We suggest the scope "considers" rather than "includes" substations and power plants at a minimum. We further suggest that this SAR requires the final standard will provide some degree of flexibility based on assessment of risk and other factors that affect cost/benefit.	Modified definitions and modified detailed description to include use of a risk-based approach to identifying assets. The word consider is not appropriate in a standard as is does not provide a measureable quality.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	The definition of "Critical Cyber Assets" requires refinement. First, the two sentences are somewhat conflicting in presenting a clear definition for this term. Next, the criticality of Cyber Assets will vary with location and application, therefore the level of risk associated shall vary as well. If the intent of this Standard is directed at removal of vulnerability from external threats, it should be better addressed. Along similar lines, if the focus is on particular layers of protocol, this should also be made clear.	Definitions have been modified and the detailed description has been modified to include the use of risk-based methodologies. The scope of the standard is not limited to vulnerabilities from external sources, but includes internals threats as well.
Lyman Schaeffer, PG&E		1	The SAR proposes to include substations and generation facilities within its definition of critical cyber assets. This is a significant expansion of the emergency action standard. Moreover, we believe that such an expansion will undermine industry efforts in this area as it will require tremendous resources to manage minimal risk and detract from our efforts to improve security in key operating systems.	The use of risk-based assessments to identify those assets that should be included in the cyber security program has been included.
Marcus W. Nichols,Omaha Public Power District		1	The Critical Cyber Assets definition is too broad. The criticality of the cyber assets will vary with location and how they are used. For example, substation automation at a rural 115 kV substation may not be critical to the reliability of the interconnected system. In addition, depending upon the use of data in inter-utility data exchanges, that link may not be critical to the real-time operation of the power system. These systems should not all be subject to the same requirements. The following "terms" listed in the proposed definition of "Critical Cyber Assets" are vague and therefore open to interpretation: oBlack Start oSpecial Protection Systems The proposed definition of "Critical Cyber Assets" expands the scope from the definitions in the Urgent Action Request to specifically include the following. oPower Plant Control oSubstation Automation Control Inclusion of these types of assets raises the criticality to the same level as system control centers, and energy management systems. Although important on an individual basis, generating stations and many substations, if tripped, will not cause cascading outages or other wide-area impacts. Existing system design allows for these contingencies. As a result, including such facilities may tend to divert resources from more important assets. Expanding the proposed definition of "Critical Cyber Assets" to include these additional systems is unrealistic unless full compliance is not expected for 10 years or more. Resource constraints cannot support such an expanded scope with compliance expected in a shorter time-frame. In some cases, especially where older technologies are used, there will be technological constraints preventing compliance. Upgrading those older facilities to newer technologies in order to become compliant simply collides with resource constraints.	The use of risk-based assessments to identify those assets that should be included in the cyber security program has been included.
Patti Metro, FRCC		1	The basis for the entire standard setting process is reliable operation and planning of the Bulk Electric System. Until the industry clearly and concisely defines, Bulk Electric System, this process is burdened with questions of applicability. One of the problems with the urgent action standard is that the definitions required too much interpretation. While the new SAR definitions are improved, we feel that the definition of Critical Cyber Asset needs further clarity to ensure that it is consistently applied across the industry. We suggest referencing a methodology that would be created by each Region based on factors such as transmission voltage, % of load, size of generating units. This type of methodology would be used to determine which assets if compromised would have an impact on reliable operations of the system. It would answer such questions as:· · Power plant control systems are critical cyber assets, but how does an organization make a determination of which generating units are applicable? · What is an appropriate amount of load shedding that would be considered a Critical Cyber Asset? · Substation automation control systems that have an impact to the reliability of bulk electric systems are covered under the standard, but there is no guideline for an organization to follow to identify which substations might impact r As to inclusion of power plant control systems, while eventually these systems might belong in the standard, we do n that they should be included in this standard since the intent is to replace the Urgent Action Standard as soon as pos However, if the power plant systems are included, we feel that consideration just be given for older legacy systems w power plants where upgrades or specific controls may not be technically or financially feasible. These systems shou still conform to some level of security, but this may be through compensating controls such as network isolation, rathe than the full set of requirements. In addition, there should be a comma after "automatic generation control" to separate it from "load shedding" in the definition of Critical Cyber Assets. In the definition of Cyber Asset, the use of the term network protocol stack is vague. If network protocol stack is meant to be TCP-IP, the definition should be modified to include this specific protocol stack. The following re-wording on the definition of Security Incident is provided for consideration: Any physical or cyber event of malicious or possibly suspect origin that disrupts the functionaloperation of a critical cyber asset or	The use of risk-based assessments to identify those assets that should be included in the cyber security program has been included. During the balloting of the Urgent Action standard, the industry commented that a permanent standard should be developed and that is should raise the level of security beyond the level provided by the UA Standard through expanded definitions and broader applicability.

	Yes	No	Comments	Response
Question 1: **Do you agree with the definitions included in the SAR?**	10	26		
Phil Sobol, Aquila, Inc		1	Should have a comma after "automatic generator control" for Critical Cyber Assets definition. Under "Security Incident", I would replace "that" with "with intent to". Additionally, we question the inclusion of power plants and substations with automated controls. Older systems are not as vulnerable to attacks since they are not using an IP stack to communicate nor are they communicating over the public network. In some power plant cases, these are stand-alone systems which have no connectivity to the Internet or back to the corporate network. Same with substation communication. The task to comply is very large. Adding in power plants and substations at this time expands the scope of the requirements making it more difficult to reach compliance in the specified timeframe. It would be better if these requirements were phased in later giving the industry time to do the work and consider how to recover costs.	The definitions have been modified. Any implementation plan associated with the permanent standard should address the phasing out of legacy systems. The standard does not require an entity to replace all its systems, only to apply the standard to those assets that fall within the scope of the standard. As entites replace assets, those new assets will have to be evaluated for inclusion in the entitiy's cyber seurity program.
Richard Brooks, Consultant		1	Regarding the definition for "Cyber Assets": The phrase "network protocol stack" is open to interpretation and mat causde confusion as parties attempt to identify Cyber Assets. As an example, some data communicaiton standards, e.g. IEEE 802.11b may not be associated witha specific "Network layer" protocol., such as the Internet Protocol (IP), but devices implementing 802.11b may indeed be essential to electric system opertions and should possibly be considered a cyber asset. Ref: IEEE 802.11b information is available at http://standards.ieee.org/getieee802/download/802.11b-1999.pdf	Definitions have been modified. The drafting team believes security of wireless communications is addressed in the UA Standard, which will be used as the basis of the permenent standard, through the use of access points into the entity's electronic security perimeter.
Robert Metcalf, MidAmerican Energy Company		1	The last sentence of the definition of "Cyber Assets" adds more confusion than value. We suggest the definition for Cyber Assets be, "Those systems (including hardware, software, and data) and communication networks (including hardware, software, and data) associated with bulk electric system operation. This definition applies only to systems or devices that use an IP based protocol."	Definition has been modified.
Roman Carter, Southern Co. Generation and Energy Marketing		1	Cyber Assets: This definition applies only to systems or devices that use a network protocol Stack for communications. This statement seems to exclude most SCADA host to remote terminal unit communications, power plant control system bus communications, substation automation communications, etc. Therefore, the Critical Cyber Assets definition would seem to be broader than the Cyber Assets definition. Critical Cyber Assets: The response of the drafting to the industry comments made on the Draft SAR Version 1 clearly recognizes the near term impracticality of meeting cyber security requirements for power plant control, remote terminal units, and other field devices. Placing such requirements in a standard with the hope that technologies will develop in a timely manner to meet some projected implementation schedule is unacceptable. The Critical Cyber Assets definition should specifically exclude power plant control, remote terminal units, substation automation control, protective relays, etc.	The definitions of cyber assets and critical cyber assets have been modified and a definition of Bulk Electric System Assets has been added.
Seiki Harada, BC Hydro		1	According to the present version of the Cyber Asset Definition, a SCADA system may be exempted from the application of the standards if it happens to use a very old networking that is not on a stacked protocol. I would say all SCADA for bulk power system must be included. Additionally, the detailed description section essentially lists two major purposes for the standards: bulk system reliability and efficient market. Looking at the definitions for Cyber Assets and Critical Cyber Assets, they are defined only for bulk system reliability. If we are truly serving the two purposes, we must include such systems as eTAG, OASIS and other market oriented systems. The definition of Critical Cyber Assets includes 'black start'. I am not sure if this is pointing to the process to restart the part of the grid that collapsed, or the systems required to start up a generating station that tripped off. Perhaps, we need to qualify the words 'black start'.	The definitions of cyber assets and critical cyber assets have been modified and a definition of Bulk Electric System Assets has been added. The statement regarding a company-owned network being compliant with the standard is accurate as long as the network is truly a separate, company owned and operated network and is separate from public access. We are referring to the function of black start and those cyber assets that support that function. Voltage Stability is addressed under control functions.
Stuart Brindley, IMO (Ontario)		1	For "Cyber Assets", delete the sentence "This definition applies only to systems or devices that use a network protocol stack for communications." As it is unnecessarily detailed and limiting.	Definition has been modified. See joe wiess response.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.		1	The existing definitions are reasonable. The term "bulk electric system functions" used in the Critical Cyber Assets definition should be clarified. This document is being interpreted by many users unfamiliar with the precise interpretation of this term. This definition alone sets the scope for inclusion or exclusion of many assets depending on the interpretation. National and Regional conference calls have previously spent a good deal of time on this issue in the Urgent Action Standard (with varied interpretations) so it seems reasonable to include it here even if it is a duplication of another NERC document. If there are regional differences then regions should be required to attach their definitions to this SAR.	Definition has been added for Bulk Electric System assets.
William Lucas, WE Energies		1	Inclusion of power plant control systems and other monitoring and control systems may place an undue burden on utilities to comply with the standards. Establishment of cyber and physical perimeters with auditing and monitoring for changes at all power plants and substations will require significant funding and time to implement control and isolation changes. While we agree with the concept of including only routable protocol devices, It would be less onerous to require a less restrictive controls measure than what is required for control centers. Especially if the routable protocol field devices can be certified to be directional in nature with no external network access.	The definitions of cyber assets and critical cyber assets have been modified and a definition of Bulk Electric System Assets has been added. The statement regarding a company-owned network being compliant with the standard is accurate as long as the network is truly a separate, company owned and operated network and is separate from public access.
Neil Shockey, Southern California Edison			No Response	

	Yes	No	Comments	Responses
Question 2: **The SAR requires that data communications between secure perimeters be engineered to a statistical probability of 99.5% uptime on an annual basis (or, 43.8 hours downtime, per year). Do you agree with this as a reasonable design goal?**	14	20		
Alan Johnson, Mirant Corporation		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Bill Wagner, Calpine		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Everett Ernst, OG&E Electric Services		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Mark A. Creech, Tennessee Valley Authority		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Robert Metcal, MidAmerican Energy Company		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Marcus W. Nichols,Omaha Public Power District		1	An annual availability of 99.5% for communications between secure perimeters such as the control center and a remotely located control room seems reasonable. However, if this requirement includes communications to substation and plant sites, then the requirement should be the cumulative availability summed over all sites. For example, communications to a very rural/remotely located substation may be down for more than 43.8 hours during a year, but the cumulative availability to all substation and plant sites would be less than 43.8 hours annually (assuming these other sites do not have similar extended communications outages.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Jim Cyrulewski, International Transmission Company		1	Find 99.5 reasonable. In the standard need to define downtime, i.e., what classifies as downtime. For example, a lease line has three substations on it. Say one line goes down for one hour, is it a 3 hour downtime (one hour downtime per substation) or one hour per line. Do planned outages count against 99.5%?	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Richard Brooks, Consultant		1	Provided there are efficient and appropriate failover procedures and processes in place to ensure that alternate communcation channels are available during such outages.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Richard Kinas, OUC	1		The SAR should provide "communications" availability requirements, in that communications required to perform a specific task could be primarily data orientated during regular business and possibly voice during emergencies, or specific asset failure. The communications requirement should be specified for the function being performed not on the specific underlying infrastructure.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
William Lucas, WE Energies		1	This is not an unreasonable expectation. Increasing availability may be difficult for some.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Phil Sobol, Aquila, Inc		1	This is usually the case. However there are instances of solar activity and equipment failure that might reduce that number. Most communication paths are non-redundant due to the cost involved. This goal is achievable, however I am not sure that this is a "Security Issue". This is more of a business continuity issue. The 99.5% uptime would only apply to normal operating conditions per control area. Force majeure would have to be excluded since these conditions cannot fully guarantee a 99.5% uptime.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.

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Question 2: **The SAR requires that data communications between secure perimeters be engineered to a statistical probability of 99.5% uptime on an annual basis (or, 43.8 hours downtime, per year). Do you agree with this as a reasonable design goal?**	14	20		
Alan Boesch, Nebraska Public Power District		1	This SAR is to address security of the cyber assets. Availability is a different subject and if needed should be covered in a separate SAR.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Keith Comeaux, CLECO Power		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Allen Chang, BCTC		1	a) The design of % uptime should be based upon the importance of the data communications between secure perimeters on a per case basis. On a critical link between secure perimeters, the 99.5% uptime may not be sufficient. b) The % uptime design for data communications is a separate issue from Cyber Security and should not be within the scope of a Cyber Security Standard. c) The % uptime/availability for "cyber security" applications or devices (eg. firewalls, intrusion detection system, etc.) has relevance for a Cyber Security Standard.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Cory Cipra,- Burns & MCDonnell		1	A similar practice and goal associated with most critical networks and systems in other industries, including telecommunications, is "5 Nines" (99.999%). Although this is the case, there are considerable contrasts and differences between availability and reliability. Further definition of "data communications between secure perimeters" is required. To further expand on the definition of "data communications between secure perimeters," the availability or uptime of this communications should be a function of the level of criticality associated with those communications. It should also include a factor that determines the influence on the continued delivery of service.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Gerald Rheault, Manitoba Hydro		1	Manitoba Hydro believes that because of the variety of different critical cyber systems referenced here, it would be very difficult to define a common availability value for all the different critical cyber systems. The most important requirement is to provide a level of reliability such that even a single compromise of a critical cyber asset will not compromise system security. New critical cyber facilities should be designed to a level of robustness, fault tolerance, security, and criticality that will ensure that reliability of the bulk electric system is not compromised. Existing systems should be modified to meet this same level of security within a clearly defined reasonable time horizon subsequent to implementation of the Standard. Also, as stated above in 2, we believe that availability is a performance indicator and is not relevant in defining the cyber security requirements.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Grant McDonald, Allegheny Energy Group Representative		1	There should be no availability requirements in this SAR as availability is not directly related to cyber security. This is a reliability issue rather than a security issue. End-users and application-based working groups (NERC, ECAR, Reliability Coordinators, individual companies, etc.) should determine availability requirements.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	Does this requirement belong in a Cyber-Security Standard or a Reliability-Communication Standard? NPCC feels that if this ultimately is retained that 99.5% is too low or insufficient.NPCC feels that entities who rely on Data Communication provided by third parties that non-compliance due to third party should not be assessed as such but be recognized and dealt with through contractural agreements and revisions thereof.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Jack Hobbick, Consumers Energy		1	This is a reliability requirement, not a security requirement	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Jim Hiebert, WECC EMSWG		1	Broad reliability requirements and metrics do not belong in this security standard. Due to the nature of the industry, there are many different scenarios where loss of data communications is not due to any malicious event. One example was the loss of communications due to hurricane Isabelle.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Joe Weiss, KEMA		1	The critical need for communications is during an upset event such as August 14th. The requirement should be that communications have a 99.5% availability including during upset events.	this addition to the Cyber Security Standard, this item was deleted.
John G. Maguire, PJM Interconnection, LLC		1	A specific uptime requirement is not expressly a security concern. The security concern is "availability". As this is a scope document, the language should be written to indicate that security requirements in the standard should not hinder the operational performance or operational availability requirements of the critical cyber assets, and in the SAR should be scoped as such.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.

	Yes	No	Comments	Responses
Question 2: **The SAR requires that data communications between secure perimeters be engineered to a statistical probability of 99.5% uptime on an annual basis (or, 43.8 hours downtime, per year). Do you agree with this as a reasonable design goal?**	14	20		
John Horakh , MAAC		1	We have no reason to believe a 99.5% uptime probability is any more reasonable than 99.0% or 99.9%. There is a tradeoff between the cost of increased availability and the cost of the adverse consequences resulting from downtime. Does the downtime cause loss of load? If so, a 99.5% uptime may be too low, since bulk electric systems (at least some) are designed for a loss of load expectation of one occurrence in ten years. In any case, the use of "hard" numbers like 99.5% is not appropriate in the SAR. Those numbers, if appropriate, should be developed and put out for comment in the Standard, when it is written. The SAR should only indicate that a very high level of availability is required.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
John Lim, Con Edison		1	Availability requirements are beyond the scope of this SAR, which addresses cyber security and protection, not availability. The requirement must be reworded to address the security aspect. In the Detailed Description section, in the paragraph starting with "Reliable and secure data communications…", suggest removing sentences starting with "Whether the means…" to the end of the paragraph. Because data communications facilities are often not owned or operated by the responsible entity, the requirement should be that the entity must ensure, where the data communication assets meet the criteria of critical cyber assets for bulk electric power operation, that a single compromise of a data communications component will not compromise the operation of the related critical cyber assets.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	Where availability is one of the three major concepts of information security (e.g. Confidentiality, Integrity, and Availability (CIA)), broad reliability requirements and metrics do not belong in this security standard. Due to the nature of the industry, there are many different scenarios where loss of data communications is not due to any malicious event. One example was the loss of communications due to hurricane Isabelle.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Kathleen Goodman, ISO-NE		1	Where availability is one of the three major concepts of information security (e.g. Confidentiality, Integrity, and Availability (CIA)), broad reliability requirements and metrics do not belong in this security standard. Due to the nature of the industry, there are many different scenarios where loss of data communications is not due to any malicious event. One example was the loss of communications due to hurricane Isabelle.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Keith Fowler, LG&E Energy Corp.		1	This is a reliability issue, not a cyber security issue.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Kevin B. Perry, Southwest Power Pool		1	Engineering a data communications circuit to assure uptime is not a cyber security issue. Data circuit availability is a continuity of business operations issue. The cyber security standard should require consideration of continuity of operations issues while not specifying technical approaches or minimum design goals. At the same time, the cyber security standard should not impose any requirements that would interfere with the ability to maintain a high availability of a system or data circuit.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	A statistical reliability requirement is inconsistent with the stated Purpose/Industry Need of protecting critical cyber assets. Limit the scope of this standard to protection. If necessary, NERC should develop a new SAR to cover reliability and update Policy 7, which is already in place.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Patti Metro, FRCC		1	The scope of this SAR and future standard should be limited to cyber-security requirements. Items such as data communications availability, and availability and redundancy of critical cyber assets address the design and engineering of the system and network; therefore, additional standards should be developed to address these items.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Roman Carter, Southern Co. Generation and Energy Marketing		1	Different assets have different requirements, so it depends on the exact asset. Would it be acceptable for a critical cyber asset to be offline continuously for 43 hours on August 14th? It really depends on the criticalness of the equipment. I believe this question pertains more to Reliability than to Cyber Security.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Seiki Harada, BC Hydro		1	44 hours per year is a lot of time to be down for 7x24 critical links. I would say we should shoot for about half of that. Further, the cumulative down time alone is not a good measure. It should be combined with the frequency of the communications link going down. For example, even if the communications link is down for only 10 hours per year, if the link was down five times every day for 10 seconds each randomly, the link would be useless.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Stuart Brindley, IMO (Ontario)		1	Such technical detail would more properly be part of the Standard, not the SAR.	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.

	Yes	No.	Comments	Responses
Question 2: **The SAR requires that data communications between secure perimeters be engineered to a statistical probability of 99.5% uptime on an annual basis (or, 43.8 hours downtime, per year). Do you agree with this as a reasonable design goal?**	14	20		
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, this item was deleted.

	Yes	No	Comments	Responses
Question 3. **The SAR does not address the availability of critical cyber assets. Should requirements be included? If so, how would availability be measured, especially for partial failures? What level of availability should be required?**	7	28		
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company		1	Just as important as secured perimeters. Need minimal availability guidelines.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC		1	This is a scope document, the language should be written to indicate that security requirements in the standard should not hinder the operational performance or operational availability requirements of the critical cyber assets, and in the SAR should be scoped as such. The measure of compliance should be indicated through specific and tested business continuity plans, redundancy of devices, hot backup sites, etc. Verifying availability through penetration or stress testing only shows the device's point-in-time durability against known attacks. BCP and redundancy can theoretically withstand any N-minus-1 attack.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	If availability of data communications is to be addressed, then availability of Critical Cyber Assets should also be addressed. Availability requirements for Critical Cyber Assets should be on a basis consistent with availability requirements for data communications. These should be determined in the Standard process, not in this SAR	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Mark A. Creech, Tennessee Valley Authority		1	Availability could be significant critical system failure	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant		1	Cyber assets, esecially thoise assets used to monitor and/or support system reliability should be included, with respect to availability. Availability requirements of such devices should be assigned according to role and risk factors, I.e the "impact" on system manageability/control should a security breach occur on the device or if the device should fail.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company		1	It rightfully addresses the availability of the data communication facilities between critical cyber assets, why wouldn't it address the availability of critical cyber assets? We measure partial availability on our business systems by looking at the number of affected users during the duration of the partial failure. A similar approach measuring the loss of control or the loss of visibility to the number of MW is a possible solution. The target should start at 99.9%.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District		1	This SAR is to address security of the cyber assets. Availability is a different subject and if needed should be covered in a separate SAR.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Johnson, Mirant Corporation		1	Don't think it's necessary to address the availability of critical cyber assets within the standard. If an asset is defined as a critical cyber asset, then by definition, it must be available to maximize the reliability of the bulk power system, which in turn is designed for a 1 day in ten-year loss of load criteria. It should be left to the asset owners to assure the integrity of the design standard.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC		1	The % uptime/availability for "cyber security" applications or devices (eg. firewalls, intrusion detection system, etc.) has relevance for a Cyber Security Standard.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 3. **The SAR does not address the availability of critical cyber assets. Should requirements be included? If so, how would availability be measured, especially for partial failures? What level of availability should be required?**	7	28		
Bill Wagner, Calpine		1	Consider adding additional text to emphasizing this is lowest acceptable availability requirement for secure communications. Other "Operational Reliability Standards" may dictate and supercede with a higher availability requirement for specific cyber assets and their functions, which may be communication dependent. For example, 99.95% availability for EMS and its respective functions, implying a higher availability requirement for the communications infrastructure supporting EMS.Perhaps in addition to overall availability requirements, the standards drafting team should consider defining minimum performance thresholds that support acceptable levels of degraded operation. For example, normal communication thresholds may be 2 second control signal response. However, during a cyber incident like a denial of service attack, that may impact the performance of the communications network to which the EMS and plant DCS are connected, a combination of operational procedure of frequency driven governor control (over economics or schedules) and a traffic prioritization scheme to provide for minimum communication performance message delivery preference, can maintain "functional availability", which is not captu	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell		1	Availability references the total amount of time the product, asset, or system was "up." In most cases, the system collectively should be the focus of address vs. the individual asset. The goal is continued delivery of service. Most well-engineered systems have redundant safeguards in place and are not dependent on a single cyber asset for availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Everett Ernst, OG&E Electric Services		1	Different parts would need different reliability levels.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro		1	Manitoba Hydro believes that because of the variety of different critical cyber systems referenced here, it would be very difficult to define a common availability value for all the different critical cyber systems. The most important requirement is to provide a level of reliability such that even a single compromise of a critical cyber asset will not compromise system security. New critical cyber facilities should be designed to a level of robustness, fault tolerance, security, and criticality that will ensure that reliability of the bulk electric system is not compromised. Existing systems should be modified to meet this same level of security within a clearly defined reasonable time horizon subsequent to implementation of the Standard. Also, as stated above in 2, we believe that availability is a performance indicator and is not relevant in defining the cyber security requirements.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	There should be no availability requirements in this SAR as availability is not directly related to cyber security. This is a reliability issue rather than a security issue. End-users and application-based working groups (NERC, ECAR, Reliability Coordinators, individual companies, etc.) should determine availability requirements.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	This is a reliability requirement, not a security requirement	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG		1	For the scope of this standard, availability of critical cyber assets should only be included for devices and/or applications that are directly related to cyber security (e.g., firewalls, intrusion detection devices, etc.) technologies. Reliability of all critical cyber assets should not be addressed in this standard.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA		1	SCADA specifications often require 99.95% availability for critical functions. It is critical that the function be maintained, not necessarily the asset.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	Availability is not within the scope of this SAR.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	Availability, like other aspects of security, may be affected by purely technical issues (e.g., a malfunctioning part of a computer or communications device), natural phenomena (e.g., wind or water), or human causes (accidental or deliberate). While the relative risks associated with these categories depend on the particular context, the general rule is that humans are the weakest link. It is critical to remember that "appropriate" or "adequate" levels of availability depend on the context. Based on the context of this security standard, it is not appropriate to include availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	Availability, like other aspects of security, may be affected by purely technical issues (e.g., a malfunctioning part of a computer or communications device), natural phenomena (e.g., wind or water), or human causes (accidental or deliberate). While the relative risks associated with these categories depend on the particular context, the general rule is that humans are the weakest link. It is critical to remember that "appropriate" or "adequate" levels of availability depend on the context. Based on the context of this security standard, it is not appropriate to include availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 3. **The SAR does not address the availability of critical cyber assets. Should requirements be included? If so, how would availability be measured, especially for partial failures? What level of availability should be required?**	7	28		
Keith Fowler, LG&E Energy Corp.		1	Availability is not specifically a cyber security issue.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool		1	Systems and system components fail for any number of reasons, most of which are not cyber security related. System availability is a continuity of business operations issue. The cyber security standard should require consideration of continuity of operations issues while not specifying technical approaches or minimum design goals. At the same time, the cyber security standard should not impose any requirements that would interfere with the ability to maintain a high availability of a system.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	A statistical reliability requirement is inconsistent with the stated Purpose/Industry Need of protecting critical cyber assets. Limit the scope of this standard to protection. If necessary, NERC should develop a new SAR to cover reliability and update Policy 7, which is already in place.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	Unless there are clear, uniform, industry based (e.g. National Institute of Standards – NIST) guidelines that are available to use in development of Critical Cyber Asset availability, pursuit of this endeavor would be fruitless, due to the wide variety of Assets in use today	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	Availability is a separate issue from security. While minimum availability requirements seem appropriate in principle, different systems (EMS vs SCADA vs Plant DCS vs ICCP vs Substation Automation vs etc., etc., etc.) may require different availability requirements. And for each system, the criteria for determining when that system is available may vary from entity to entity. Entity A may be able to function "acceptably" only when 10% or less of its user workstations are down, but Entity B may be able to operate acceptably with 25% of its user workstations down.One possible exception would be the availability of communications to the regional security coordinator. The security of the region is dependent on the availability of such communications, so requiring minimal availability based on well defined criteria would be appropriate.It must also be pointed out that availability is increased by redundancy. Redundancy also has a mitigating effect on security. That is that if a redundant asset is rendered unusable, the backup equipment will operate, offsetting the overall need for expanded security	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	The scope of this SAR and future standard should be limited to cyber-security requirements. Items such as data communications availability, and availability and redundancy of critical cyber assets address the design and engineering of the system and network; therefore, additional standards should be developed to address these items.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc		1	Most SCADA systems are redundant and are designed to continue operation with the failure of one piece of equipment. It is our experience that the SCADA master station has an availability much greater than 99.5%. Systems can be redundant with dual power supplies and such. NERC Policy 6 Section E already covers the need to redundancy. A reference to this requirement would probably be sufficient. The availability of these critical assets falls more under the business continuity umbrella than that of cyber security.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC		1	Critical cyber assets are used in the performance of functions, and while the reliability of the function must be specified, the particular methods and equipment that provide the reliability should not. As long as some sort of infrastructure and methods exist to provide this function the sprit of the SAR is met.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	this sounds more related to Reliability than Cyber Security. If a Critical Cyber Asset is offline, then it is safe from a Cyber Security Standpoint. However, the stability of the Bulk Electric system may be jeopardized if it is offline.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro		1	A good level of availability is a function of 1) implementing adequate security measures, 2) maintaining/patching software, hardware and data, 3) operating the systems safely and properly, and 4) external forces which try to disrupt orderly operation. Similar to the number of cyber incidents an entity may encounter in a year, most external factors are not under the control of the entity in question. For example, if there is an overwhelming attack on the DNS server in one sector of the Internet, all Internet based systems and networks might feel the impact (and thus degraded availability). It is not reasonable to set a standard over a measure for which the entity does not have total control over.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	Availability is an important, but completely separate requirement from Cyber Security.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies		1	Performance monitoring would be required for all cyber assets. Not only would this be costly, it may not exist for certain equipment. Not to mention the time required to implement such monitoring.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 3. **The SAR does not address the availability of critical cyber assets. Should requirements be included? If so, how would availability be measured, especially for partial failures? What level of availability should be required?**	7	28		
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

SUMMARY				Responses
Question 4. **The SAR does not require that SCADA or PCS communications be encrypted.** **Should this requirement be added for:** Yes	No	Comments		
A. **Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers** 14	21			Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
B. SCADA master station to RTU communications using peer-to-peer communications protocols 7	27			Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
C. SCADA master station to RTU communications over an established communications stack (e.g. TCP/IP) 14	19			Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
D. Data collection servers communications to substation IEDs 5	29			Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
A. Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers	14	21		
Everett Ernst, OG&E Electric Services	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC	1		Yes, for critical links, provided that the ICCP encryption products are matured and readily available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Bill Wagner, Calpine	1		The standard should detail requirements for ensuring the integrity of data transmission within expected operational performance requirements, be it through encryption, encapsulation, insulation, or isolation.The Standards Team needs to be cautious to avoid detailing technical requirements that may unnecessarily extend the use of sunset technologies, inhibit the development of new approaches that provide the functional solution at a lower cost, or force premature retirement of older equipment and systems where the risk is mitigated simply through the limited access and proprietary industrial communications protocols.For example, VPN may provide for a more cost effective encapsulation approach to ensuring the integrity of the data transmission than retrofitting specific communication protocols with encryption algorithms. Or, an existing private microwave link strictly used for generation control and transmission network monitoring probably provides sufficient insulation from unauthorized access simply through it's limited accessibility.The "integrity" requirement should apply to all cyber assets listed below that utilize or leverage any form of "open" communications infrastructure, from the internet to a POTs line with "hot" modems connected to the cyber asset.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell	1		This is very important when any communications occurs between "untrusted" networks.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	1		YES, if it is a "critical" communications implementation. In general, the electrical system impact of the loss or compromise of SCADA type data (field information and device control requests) appears to be dependent on:· · The type of communication that is occurring (control request compromise is more severe than data compromise) · The characteristics of the devices being communicated about (types of device, voltage levels, electrical system locations, etc.) · The magnitude of data being communicated over a particular communication path One possible approach would be to classify any communications implementation as "critical" if it carried control requests on power switching devices (eg. breakers) at 161 kV or above. Then encryption would be required only of "critical" communications implementations.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
A. Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers	14	21		
Guy Zito, NPCC CP9 Reliability Standards Working Group	1		Encryption Standards can run on top of existing ICCP. Integity and authentication are needed but confidentiality is not always necessary.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant	1		If sensitive information travels over a shared network infrastructure it should be encrypted to prevent unauthorized access. The authors may also wish to consider use of digital signatures for authentication of origin and digital certificates for access control authentication.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc	1		The standard has been developed and could easily be implemented. However, the reason is not as much for security as it is for restricting access to market sensitive data. This would have to be done as an entire industry so that all participants are using compatible technologies to communicate with and be able to move forward with this as a unified group.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG	1		We agree with the intent to provide secure (encrypted) communications for ICCP; however, this assumes that a product to encrypt ICCP communications is fully designed, tested, and readily available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC	1		Within the energy environment, preventing data from compromise (i.e encrypting it during transmission) is a much lower concern than verifying that the data was not modified during transit (a.k.a message integrity), that the data did in fact originate from the sender (a.k.a. message authentication) and that it can be proved that the data was sent, from the receivers point of view (a.k.a. non-repudiation). All the above functions use encryption, however the SAR seems to specify only the block cipher (data compromise) portion of the entire process.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies	1		A critical vulnerability for exploit.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Johnson, Mirant Corporation		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District		1	Depends on how the communication is done between Control Centers. If on a private network, encryption may not be required	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
A. Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers	14	21		
Gerald Rheault, Manitoba Hydro		1	The use of encryption should not be added as a requirement to this SAR if the entity uses dedicated communications systems which are physically isolated from external influences. For an entity using a shared public network resource (eg POTS, frame relay, the internet, etc), using either leased-permanent or temporary dial-up methods, all data should be encrypted to protect the data from being tampered with and ensure the security of the communication. Authorized use of the data communications capability must be ensured through authentication, confidentiality and integrity. The computing systems generally used in present SCADA or PCS communications would be inadequate to satisfy the data transfer and scan rates required in the operating environment, if encryption was required. Encryption would greatly increase the security of the data being monitored and transmitted, but for most existing systems, the cost to increase the computing power of the hardware would be prohibitive. Therefore encryption should be added to the Standard, only for communication systems which use the public network.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	Each entity deploying ICCP need to access the risk of that link. Situations such as using public communication system or passing control signals may warrant additional precautions which may be encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA		1	Encryption does not guarantee the critical functions of authentication and message integrity. Encryption may not be practical for certain generation of SCADA systems. It may not be possible to implement encryption for current plant controls and substation equipment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC		1	If this is supposed to be an industry standard, the SAR should not be scoped to include specfic requirements for a subset of the entities that are to be in compliance. ICCP is a particular communication protocol for a specific purpose, used by specific entities. Regulating a technology should not be a goal of a broad baseline industry standard. Confidentiality is the tenet to be assured, not encryption; and in the control system arena confidentiality takes a back-seat to data integrity and availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	These questions are not appropriate to be answered in this SAR. They are too detailed for a SAR. A general statement should be inserted in this SAR to indicate that encryption of communications, in general, should be considered when the Standard is written.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	If encryption is required, it should be within the protocol.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	The Cyber Security Standard should not mandate a particular technology such as encryption. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	The Cyber Security Standard should not mandate a particular technology such as encryption. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.		1	While we support the use of encryption, especially in the case where communications are occurring over the Internet, we feel in other cases it may be unreasonable or of limited value to require encryption, especially during the timeframes being considered for the current SAR. As stated in our general comments, a risk management approach should be utilized, in which case the risk involved with not protecting a given communications link would determine how critical it is that encryption technology (in this case) be deployed. Certainly we feel that ICCP communications between control centers over the Internet would be a high priority candidate for encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
A. Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers	14	21		
Kevin B. Perry, Southwest Power Pool		1	The cyber security standard should require data confidentiality and integrity along with ICCP node authentication. The cyber security standard should not prescribe technical solutions such as encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	As per the definition of Critical Cyber Assets, this would not apply if it is not an IP stack.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	Encryption will slow the communication speed of vital ICCP data between Reliability Coordinators and Control Area entities required to preserve Regional Reliability. At present thousands of values are updated via ICCP on a four-second basis, necessary for the Reliability Coordinators to monitor and validate Regional System Stability and provide enough time to act in mitigation of System Contingencies.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	It is not clear that encryption provides the necessary security to the data being transmitted.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Mark A. Creech, Tennessee Valley Authority		1	This statement depends on the vendor software	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	There is disparity between the questions being asked in this section and the actual Detailed Description in the associated SAR. The following excerpt from the SAR already indicates the inclusion of the technology described in this section: "Where the data communications capability utilizes shared public network resources (e.g., POTS, frame relay, the Internet, etc.), using either leased-permanent or temporary dial-up methods, all data must be encrypted to ensure authorized use of the data communications capability through authentication, confidentiality, integrity, and (as appropriate) non-repudiation." As indicated below FRCC commenters do not think there should be a requirement for encryption of SCADA or PCS communications. In addition, any reference to encryption should be removed from the SAR scope and future standard until proven technology is available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company		1	More important than encryption is authentication or non-repudiation.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	It should be required when encryption technology is commercially available say within 1-2 years. At that point, we feel that ICCP communications between control centers over the internet would be a priority candidate for encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
A. Use of Inter-Control Center Communications Protocol (ICCP), primarily between control centers	14	21		
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
B. SCADA master station to RTU communications using peer-to-peer communications protocols	7	27		
Alan Johnson, Mirant Corporation	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Bill Wagner, Calpine	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell	1		This is equally important as in many instances, this type of communication traverses potentially unsafe traffic areas including wireless mediums. In many cases, this traffic traverses corporate networks and other types of ubiquitous networks. It should also be noted that this may not be required in every circumstance as the encryption requirement should include a factor that takes into account the criticality of the communications including sensitivity of information. For example, the communications between a SCADA master station and a RTU that, in downstream, operates with a substation that only feeds a few residential homes, the need for encryption on that communications may not be warranted given the cost, benefits, and potential impact from a compromise. Encryption on this path may be needed however if there could be sensitive information on that communications link that could be used for the compromise of other communications or systems that may be considered critical. In other words, this should be based on a factor of criticality, sensitivity, and other factors on a case-by-case basis. The criteria has not yet been determined for that and the above are just few along with a very simple example.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	1		Do you mean by "Peer to peer communications" those that are not network protocol stack communications? If so, YES, if it is a "critical" communications implementation. However, we see this as of less importance for the older, less common protocols and of more importance for the more common protocols, especially DNP	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC	1		See comments for 4.a .Additionally modification of peer-to-peer connections for encrypted communication would be a very difficult and costly task, if it could be done at all. More than likely, a front end device of some kind would need to be used instead, however the latency which devices such as these could introduce must not adversely affect the time critical communications themselves.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Everett Ernst, OG&E Electric Services		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
B. SCADA master station to RTU communications using peer-to-peer communications protocols	7	27		
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC		1	Our understanding of peer-to-peer communications is referring to the old legacy RTU protocol utilizing RS232 communication, voice circuits, tone telemetry, etc. Generally, these legacy systems are deemed at a low risk.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro		1	The use of encryption should not be added as a requirement to this SAR if the entity uses dedicated communications systems which are physically isolated from external influences. For an entity using a shared public network resource (eg POTS, frame relay, the internet, etc), using either leased-permanent or temporary dial-up methods, all data should be encrypted to protect the data from being tampered with and ensure the security of the communication. Authorized use of the data communications capability must be ensured through authentication, confidentiality and integrity. The computing systems generally used in present SCADA or PCS communications would be inadequate to satisfy the data transfer and scan rates required in the operating environment, if encryption was required. Encryption would greatly increase the security of the data being monitored and transmitted, but for most existing systems, the cost to increase the computing power of the hardware would be prohibitive. Therefore encryption should be added to the Standard, only for communication systems which use the public network.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	As per the definition of Critical Cyber Assets, this would not apply if it is not an IP stack.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG		1	Most RTU communications using peer-to-peer or "bit oriented" protocols utilize RS232 communicaitons, voice circuits, tone telemetry, etc. The cost of implementing encryption on these systems may be prohibitive. If the communications takes place over an easily accessible public network then the owner should consider upgrading the system to IP based communication and include encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
B. SCADA master station to RTU communications using peer-to-peer communications protocols	7	27		
Joe Weiss, KEMA		1	Encryption does not guarantee the critical functions of authentication and message integrity. Encryption may not be practical for certain generation of SCADA systems. It may not be possible to implement encryption for current plant controls and substation equipment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC		1	Regulating a technology should not be a goal of a broad baseline industry standard. Confidentiality is the tenet to be assured, not encryption; and in the control system arena confidentiality takes a back-seat to data integrity and availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	These questions are not appropriate to be answered in this SAR. They are too detailed for a SAR. A general statement should be inserted in this SAR to indicate that encryption of communications, in general, should be considered when the Standard is written.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.		1	A lower priority candidate for encryption than (a.)	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool		1	The cyber security standard should require data confidentiality and integrity along with master-to-RTU authentication where technically feasible. The cyber security standard should not prescribe technical solutions such as encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	As per the definition of Critical Cyber Assets, this would not apply if it is not an IP stack.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	Most communications protocols used for this purpose encompass some form of encryption format, so no additional encryption techniques are required.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	It is not clear that encryption provides the necessary security to the data being transmitted. Also, encryption is not practical for older RTU protocols still predominant in the industry.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
B. SCADA master station to RTU communications using peer-to-peer communications protocols	7	27		
Mark A. Creech, Tennessee Valley Authority		1	This statement depends on the security channel, if public or not.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	There is disparity between the questions being asked in this section and the actual Detailed Description in the associated SAR. The following excerpt from the SAR already indicates the inclusion of the technology described in this section: "Where the data communications capability utilizes shared public network resources (e.g., POTS, frame relay, the Internet, etc.), using either leased-permanent or temporary dial-up methods, all data must be encrypted to ensure authorized use of the data communications capability through authentication, confidentiality, integrity, and (as appropriate) non-repudiation." As indicated below FRCC commenters do not think there should be a requirement for encryption of SCADA or PCS communications. In addition, any reference to encryption should be removed from the SAR scope and future standard until proven technology is available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc		1	On a closed system we don't believe the risk is great enough to warrant the expense of doing this. The communications path would have to be broken and a device inserted to communicate with the RTUs the same way the master station does using the correct protocol. It would require knowing the RTU address and data base point id's. This would be very unlikely. Another consideration is timing. It takes time to encrypt and decrypt the data stream. When you are polling your devices at a rate of once every four seconds, the possibility of getting behind and dropping some data is a real threat. Dropping or missing information in a real-time system is not an option. However, if the utility were using the public Internet to communicate over, then the need for some type of encryption is necessary. A better solution here would be VPN over public networks rather than trying to encrypt the communications on the RTU or PCL.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant		1	Communications occurring over provate network connections are less vulnerable to unauthorized access using "man in the middle" tactics, which encryption is designed to address.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert MetcalfOrganization MidAmerican Energy Company		1	More important than encryption is authentication or non-repudiation.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	Technology is not there yet. It would also require an intensive costly infrastructure to implement	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies		1	Not routable, not subject to "man in the middle" attacks	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
B. SCADA master station to RTU communications using peer-to-peer communications protocols	7	27		
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
C. SCADA master station to RTU communications over an established communications stack (e.g. TCP/IP)	14	19		
Alan Johnson, Mirant Corporation	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Bill Wagner, Calpine	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Everett Ernst, OG&E Electric Services	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC	1		Communication to RTU's over a "public network" should be given a priority.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell	1		This is equally important as in many instances, this type of communication traverses potentially unsafe traffic areas including wireless mediums. In many cases, this traffic traverses corporate networks and other types of ubiquitous networks. It should also be noted that this may not be required in every circumstance as the encryption requirement should include a factor that takes into account the criticality of the communications including sensitivity of information. For example, the communications between a SCADA master station and a RTU that, in downstream, operates with a substation that only feeds a few residential homes, the need for encryption on that communications may not be warranted given the cost, benefits, and potential impact from a compromise. Encryption on this path may be needed however if there could be sensitive information on that communications link that could be used for the compromise of other communications or systems that may be considered critical. In other words, this should be based on a factor of criticality, sensitivity, and other factors on a case-by-case basis. The criteria has not yet been determined for that and the above are just few along with a very simple example.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	1		YES, if it is a "critical" communications implementation.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG	1		Particular priority should be given to SCADA master stations communicating over a public network to RTU's (especially SCADA master stations sending "control" signals to RTU's).	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
C. SCADA master station to RTU communications over an established communications stack (e.g. TCP/IP)	14	19		
Phil Sobol, Aquila, Inc	1		This is assuming that communications are on a potentially public accessible network.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC	1		See comments for 4.a. Additionally this would be fairly easy to implement on the IP stacks running on the RTU's, but in pratice, it would probably be implemented through a front end device such as a small VPN firewall located just in front of each device.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies	1		Network routable, subject to attack/exploit.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro		1	The use of encryption should not be added as a requirement to this SAR if the entity uses dedicated communications systems which are physically isolated from external influences. For an entity using a shared public network resource (eg POTS, frame relay, the internet, etc), using either leased-permanent or temporary dial-up methods, all data should be encrypted to protect the data from being tampered with and ensure the security of the communication. Authorized use of the data communications capability must be ensured through authentication, confidentiality and integrity. The computing systems generally used in present SCADA or PCS communications would be inadequate to satisfy the data transfer and scan rates required in the operating environment, if encryption was required. Encryption would greatly increase the security of the data being monitored and transmitted, but for most existing systems, the cost to increase the computing power of the hardware would be prohibitive. Therefore encryption should be added to the Standard, only for communication systems which use the public network.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	Using a risk analysis based on the criticalness of the device and the type of communication rather than a hard requirement makes more sense.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA		1	Encryption does not guarantee the critical functions of authentication and message integrity. Encryption may not be practical for certain generation of SCADA systems. It may not be possible to implement encryption for current plant controls and substation equipment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC		1	Regulating a technology should not be a goal of a broad baseline industry standard. Confidentiality is the tenet to be assured, not encryption; and in the control system arena confidentiality takes a back-seat to data integrity and availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	These questions are not appropriate to be answered in this SAR. They are too detailed for a SAR. A general statement should be inserted in this SAR to indicate that encryption of communications, in general, should be considered when the Standard is written.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
	14	**19**		
C. SCADA master station to RTU communications over an established communications stack (e.g. TCP/IP)				
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.		1	A lower priority candidate for encryption than (a.)	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool		1	The cyber security standard should require data confidentiality and integrity along with master-to-RTU authentication where technically feasible. The cyber security standard should not prescribe technical solutions such as encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	It is not clear that encryption provides the necessary security to the data being transmitted.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Mark A. Creech, Tennessee Valley Authority		1	This statement depends on the security channel, if public or not.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	There is disparity between the questions being asked in this section and the actual Detailed Description in the associated SAR. The following excerpt from the SAR already indicates the inclusion of the technology described in this section: "Where the data communications capability utilizes shared public network resources (e.g., POTS, frame relay, the Internet, etc.), using either leased-permanent or temporary dial-up methods, all data must be encrypted to ensure authorized use of the data communications capability through authentication, confidentiality, integrity, and (as appropriate) non-repudiation." As indicated below FRCC commenters do not think there should be a requirement for encryption of SCADA or PCS communications. In addition, any reference to encryption should be removed from the SAR scope and future standard until proven technology is available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant		1	Provided such communications are performed over a peer-to-peer, private network connection. If the communications are occurring over a shared network, then encryption should be used.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company		1	More important than encryption is authentication or non-repudiation.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	Depends on the type of equipment-private or public. This would be a lower priority candidate.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel			No response; see response to Question 6	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
C. SCADA master station to RTU communications over an established communications stack (e.g. TCP/IP)	14	19		
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
D. Data collection servers communications to substation IEDs	5	29		
Bill Wagner, Calpine	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro	1		No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell	1		See comments on 4b.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	1		YES, if it is a "critical" communications implementation and if the communications goes out of the substation perimeter itself. Data could intentionally "leave" the substation perimeter over a specific communications path or could unintentionally "leak" because of the use of a wireless network. Both of these conditions, and any others like them, should be protected by encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Johnson, Mirant Corporation		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	no comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District		1	Depends on the communications system used to communicate between the servers and the IEDs	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC		1	Further explanation of this question is warranted. If the communication is using stacked based protocol and the~~communication is to send~~ IEDs can be controlled or configured remotely ~~control or access relay devices,~~ then ~~again~~ encryption is needed.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
D. Data collection servers communications to substation IEDs	5	29		
Everett Ernst, OG&E Electric Services		1	Yes only if network protocol stack and the communications circuit extends outside the substation fence.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro		1	The use of encryption should not be added as a requirement to this SAR if the entity uses dedicated communications systems which are physically isolated from external influences. For an entity using a shared public network resource (eg POTS, frame relay, the internet, etc), using either leased-permanent or temporary dial-up methods, all data should be encrypted to protect the data from being tampered with and ensure the security of the communication. Authorized use of the data communications capability must be ensured through authentication, confidentiality and integrity. The computing systems generally used in present SCADA or PCS communications would be inadequate to satisfy the data transfer and scan rates required in the operating environment, if encryption was required. Encryption would greatly increase the security of the data being monitored and transmitted, but for most existing systems, the cost to increase the computing power of the hardware would be prohibitive. Therefore encryption should be added to the Standard, only for communication systems which use the public network.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	If someone has already gained physical access to the substation, physically controlling the switches would be far easier than trying to utilize the cyber assets	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG		1	Further clarification of data collection servers is required. Are these the relay devices and are they communicating using TCP/IP? Over public network (Internet)? Are these devices used for control purposes? If the answer to these is "yes" then these should be considered for encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA		1	Encryption does not guarantee the critical functions of authentication and message integrity. Encryption may not be practical for certain generation of SCADA systems. It may not be possible to implement encryption for current plant controls and substation equipment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC		1	Regulating a technology should not be a goal of a broad baseline industry standard. Confidentiality is the tenet to be assured, not encryption; and in the control system arena confidentiality takes a back-seat to data integrity and availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	These questions are not appropriate to be answered in this SAR. They are too detailed for a SAR. A general statement should be inserted in this SAR to indicate that encryption of communications, in general, should be considered when the Standard is written.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	The Cyber Security Standard should not mandate a particular technology. It should address the security requirements to be met for protecting critical cyber assets. It should be left to the responsible entity to select the technology appropriate for their environment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.		1	A lower priority candidate for encryption than (a.)	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool		1	The cyber security standard should require data confidentiality and integrity along with server-to-IED authentication where technically feasible. The cyber security standard should not prescribe technical solutions such as encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	It is not clear that encryption provides the necessary security to the data being transmitted.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Yes	No	Comments	Responses
D. Data collection servers communications to substation IEDs	5	29		
Mark A. Creech, Tennessee Valley Authority		1	This statement depends on the security channel, if public or not.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	There is disparity between the questions being asked in this section and the actual Detailed Description in the associated SAR. The following excerpt from the SAR already indicates the inclusion of the technology described in this section: "Where the data communications capability utilizes shared public network resources (e.g., POTS, frame relay, the Internet, etc.), using either leased-permanent or temporary dial-up methods, all data must be encrypted to ensure authorized use of the data communications capability through authentication, confidentiality, integrity, and (as appropriate) non-repudiation." As indicated below FRCC commenters do not think there should be a requirement for encryption of SCADA or PCS communications. In addition, any reference to encryption should be removed from the SAR scope and future standard until proven technology is available.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc		1	These servers would be inside the substation on a dedicated network to the IEDs and should not require encryption. If this communications is stacked, and via a public accessible network the answer would be Yes.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant		1	Provided such communications are oreformed over a perr-to-peer, provate network connection. If the communications are occurring over a shared network, then encryption should be used.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC		1	Within the energy environment, preventing data from compromise (i.e encrypting it during transmission) is a much lower concern than verifying that the data was not modified during transit (a.k.a message integrity), that the data did in fact originate from the sender (a.k.a. message authentication) and that it can be proved that the data was sent, from the receivers point of view (a.k.a. non-repudiation). All the above functions use encryption, however the SAR seems to specify only the block cipher (data compromise) portion of the entire process.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company		1	More important than encryption is authentication or non-repudiation.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	lower priority	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies		1	No network connections between IED and RTU path	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel			No response; see response to Question 6	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Comment	Responses
E. If the above were included, how long would each take to complete?		
Alan Boesch, Nebraska Public Power District	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Johnson, Mirant Corporation	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Bill Wagner, Calpine	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Mark A. Creech, Tennessee Valley Authority	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company	No comment	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell	The length of time to complete is a function of the size and scope of each network/system. In general, overlaying encryption technologies is not usually an extremely extensive and intrusive process. There are products available today which make this fairly easy to accomplish even in situations where many feel products and technologies do not exist for the "legacy" environments	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	a. We do this routinely already on "critical" communications implementations b. Potentially a major effort (several years) and might imply RTU changeout c. We will do this as a matter of policy on "critical" communications implementations, d. We would encrypt outside the substation perimeter as a matter of policy for "critical" communications implementations	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Everett Ernst, OG&E Electric Services	(a) 1 yr (b) no (c) 2 yrs (d) no These are budget issues if the time frame is under 2 years.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Guy Zito, NPCC CP9 Reliability Standards Working Group	NPCC feels that it is vital that the data being referred to has integrity (i.e. not corrupt and has a trusted source). NPCC feels that encrypting does not sufficiently accomplish this. NPCC feels encryption, depending on where it may be proposed would represent a costly and ineffective solution.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy	At least 5 years depending upon availability of technology and level of expenditures required	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Cyrulewski, International Transmission Company	Could take a couple of years. This work is very expensive.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA	Encryption does not guarantee the critical functions of authentication and message integrity. Encryption may not be practical for certain generation of SCADA systems. It may not be possible to implement encryption for current plant controls and substation equipment.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Comment	Responses
E. If the above were included, how long would each take to complete?		
John G. Maguire, PJM Interconnection, LLC	Approximately two years after the technology became available, to ensure the practical integrity of the technology.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC	These questions are not appropriate to be answered in this SAR. They are too detailed for a SAR. A general statement should be inserted in this SAR to indicate that encryption of communications, in general, should be considered when the Standard is written.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison	These comments apply to the whole question 4. Encryption is not a requirement, it is a technology employed to achieve certain goals. In the context of the operation of cyber assets related to bulk electric operation, the requirements are authentication of communicating parties, integrity of the data transmitted (i.e that the data has not been modified or corrupted) and in some cases, confidentiality or privacy of the data. Encryption is not always required to achieve these goals. One would expect that for bulk electric operation, these communication links are either privately owned, or dedicated virtual or leased facilities.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power	It would take years due to cost issues, studies performed, planning efforts and RFP's	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.	Allowing for industry specific standards (defacto or otherwise) to mature, products to be developed and then implemented we estimate 3 - 4 years for all of the above.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool	There is a technical solution for assuring ICCP node authentication and data confidentiality and integrity that has undergone interoperability testing. Implementation of this technical solution would require a minimum of a year, much longer for some companies with aging legacy systems and out-of-sync budget cycles. Assuming technical solutions exist for the other technologies, implementation will require several years due to the large number of systems or devices to be protected and the need to assure uninterrupted reliability and economic operations.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Larry Conrad, ECAR Critical Infrastructure Protection Panel	Indications are that completion would take several years. See general comments for more detail.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee	Unknown at this time, due to the diversity of Cyber Asset infrastructures in place owned by the Region's Members	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District	It is difficult to estimate time to implement since the scope is not well defined regarding which communications would require encryption. It is estimated that at least 10-15 years would be required if all of the above must be encrypted such that critical functions still operate correctly while still meeting real-time response requirements. Data is transmitted via any number of public networks. These networks may include data protocols that are proprietary to a certain service provider.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC	The time-lines provided are dependent on the development of appropriate technology.a: ICCP - industry wide, 6 to 12 months for basic hardware point to point (IPSEC VPN). Secure ICCP 18 to 24 months. b: Peer to peer would require R&D and product development, we are not aware of existing technology, we expect 24 to 36 months. c: IPSEC VPN 12 to 24 months for implementation. Encryption within DNP3 24 to 36 months. Other products/solutions 24 to 36 months???d : 12 to 24 months.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc	ICCP has already been developed. As far as the other forms it would take, in many cases there hasn't been a standard developed. This could take a year to develop the standard and several more years to develop, fabricate, test and implement the equipment and protocols necessary to be able to work within a real-time system effectively.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant	In many cases hardwre level encryption devices can be installed using a phased approach with minimal impact to existing processes and procedures. Implementation time and effor vary depending on the numbr of network nodes requiring encryption.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC	Items 4.a,c, and d could be implemented almost immediately through the use of a front end device, however, item b would take some investigation into the peer-to-peer protocol to investigate the encapsulation possibility and again using the front end device.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing	Anywhere from 2-10 years	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro	This will take a long time to implement (> 10 years?) and a lot of money. We may consider implementing these new measures only to the new implementations and major upgrades as of a certain future date.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

Question 4. The SAR does not require that SCADA or PCS communications be encrypted. Should this requirement be added for:	Comment	Responses
E. If the above were included, how long would each take to complete?		
Stuart Brindley, IMO (Ontario)	This level of technical detail is not appropriate for this SAR, and would be more appropriate as part of the Standard itself.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies	This could take 6 years or more and will be significant in cost. We are not currently encrypting SCADA data. That would require a change to the SCADA front-ends and software, EMS software, all RTU's, and possibly the MAS radio system we utilize as a transport. This could have a potential price tag in excess of $10M. There needs to be some uniformity with encryption standards selected to match multiple vendor equipment deployed on a single network. Do we use 3DES or AES? Key management is another issue. No small task here.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lyman Schaeffer, PG&E	No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison	No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.	No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 5. **The SAR does not require redundancy of critical cyber assets, but rather their protection. Should redundancy also be required?**	5	30		
Jim Cyrulewski, International Transmission Company	1		No comment	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Mark A. Creech, Tennessee Valley Authority	1		No comment	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John G. Maguire, PJM Interconnection, LLC	1		Redundancy as it applies to the physical assurance of the availability of systems. Essentially, in a black-hole scenario, the ability to recover is essential to the bulk-electric system; in this case, redundancy would be the only way to ensure availability.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Brooks, Consultant	1		If a disruption or security breach of such assets could affect system reliability then they should require the same level of redundancy as other critical components.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Robert Metcalf, MidAmerican Energy Company	1		One easy way to convince yourself that redundancy should be required is to look at all the utility business systems that have redundant facilities. The critical cyber assets should be held to the same or higher standard.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Everett Ernst, OG&E Electric Services		1	No comment	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Comeaux, CLECO Power		1	No comment	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Stuart Brindley, IMO (Ontario)		1	No comment	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Boesch, Nebraska Public Power District		1	Redundancy like availability is a separate issue and should be covered under a separate standard.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Alan Johnson, Mirant Corporation		1	The SAR and the resulting standard should only require the protection of the critical cyber assets. Probably need to define "protection" (is this the 99.5% availability per annum?) as there are different possible levels of protection, which gets into the redundancy issue. Once the required level of protection is defined, an entity should be able to decide how said level is accomplished. Maybe it's through redundancy; maybe it's accomplished some other way.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Allen Chang, BCTC		1	Redundancy and % available are addressing similar issues. Redundancy of critical cyber assets should be addressed in another standard. Redundancy and availability for "cyber security" applications or devices has relevance for a Cyber Security Standard.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Bill Wagner, Calpine		1	The SAR should be flexible enough to allow for a redundancy scheme to satisfy the availability requirement and thereby providing respective functional protection.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Cory Cipra,- Burns & MCDonnell		1	The redundancy of critical cyber assets should not be a requirement for this standard, however most well engineered systems have some method of redundancy in place. The goal should be, as stated, the protection, reliability, and availability of the systems to deliver their function not the assets themselves. Although this is true, the redundancy of critical cyber assets would, in many cases, directly correlate with total availability of continued delivery of service.	Due to industry concencus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 5. **The SAR does not require redundancy of critical cyber assets, but rather their protection. Should redundancy also be required?**	5	30		
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force		1	In our opinion, availability of the critical cyber asset is the goal and redundancy (in its various forms) is one of the means of achieving that availability. We would prefer to see availability requirements specified and be given the flexibility to meet the requirements using whatever solution we deem best. Presumably, if a company can meet the availability requirements, on a continuing basis, year after year, that in itself demonstrates that they are devoting sufficient resources to the problem. In our view, the above strategy works for the "production" critical cyber asset. In the case of a "backup " critical cyber asset, however, it seems very appropriate to explicitly specify that a backup system exist and be tested on a routine basis.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Gerald Rheault, Manitoba Hydro		1	The SAR states that the critical cyber assets that support bulk electric system operations should be safeguarded by establishing standards "to provide a level of assurance that even a single compromise of a critical cyber asset does not compromise system security, and thus, risk grid or market failure". The SAR should be flexible enough to allow this criteria to be met in any way possible including redundancy if required. This will allow entities to implement solutions which are both cost effective and synchronized with their existing facilities and systems. However, redundancy should be incorporated if it is the best solution to meet the criteria.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Grant McDonald, Allegheny Energy Group Representative		1	This is a reliability issue rather than a security issue. End-users and application-based working groups (NERC, ECAR, Reliability Coordinators, individual companies, etc.) should determine redundancy requirements.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Guy Zito, NPCC CP9 Reliability Standards Working Group		1	NPCC feels the question, as written, is subject to a number of different interpretation. NPCC would like the SAR drafting team to clarify its request. The interpretations of this question may mislead the drafting team to a false result.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jack Hobbick, Consumers Energy		1	This would be a reliability requirement.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Jim Hiebert, WECC EMSWG		1	Depending on a responsible entities' environment, redundancy may not be the most effective solution. The standard should mandate security requirements, not technical solutions.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Joe Weiss, KEMA		1	Redundancy does not necessarily mitigate cyber vulnerabilities. Two systems on the same compromised network can be equally vulnerable even though there is "traditional" redundancy.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Horakh , MAAC		1	Redundancy is really just a way to achieve increased availability. If availability is addressed (see Question # 3), it is not necessary to separately consider redundancy.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
John Lim, Con Edison		1	The scope of this SAR should address protection and security of cyber assets, not availability.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Karl Tammer, ISO/RTO Council - Standards Review Committee		1	Depending on a responsible entities' environment, redundancy may not be the most effective solution. The standard should mandate security requirements, not technical solutions.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kathleen Goodman, ISO-NE		1	Depending on a responsible entities' environment, redundancy may not be the most effective solution. The standard should mandate security requirements, not technical solutions.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Keith Fowler, LG&E Energy Corp.		1	Again, a availability issue, not a cyber security issue.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Kevin B. Perry, Southwest Power Pool		1	The cyber security standard should require consideration of continuity of operations issues while not specifying technical approaches such as system redundancy.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Yes	No	Comments	Responses
Question 5. The SAR does not require redundancy of critical cyber assets, but rather their protection. Should redundancy also be required?	5	30		
Larry Conrad, ECAR Critical Infrastructure Protection Panel		1	Develop a new SAR to cover reliability and update Policy 7, which is already in place.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee		1	Redundancy requirements should be left to the Cyber Asset Owner's own risk analysis of respective infrastructures, and their subsequent System impact due to failure.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Marcus W. Nichols,Omaha Public Power District		1	Redundancy of critical cyber assets should not be confused with highly available functions. Redundancy is probably the most popular means to achieve high availability. As mentioned earlier, redundancy provides inherent security is some cases. Requirements should exist to restore critical functionality rather than to require redundancy.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Patti Metro, FRCC		1	The scope of this SAR and future standard should be limited to cyber-security requirements. Items such as data communications availability, and availability and redundancy of critical cyber assets address the design and engineering of the system and network; therefore, additional standards should be developed to address these items.As a part of ongoing activities related to the blackout investigation, NERC will likely address redundancy through standards for backup control plans. These will likely be much more stringent, and will possibly conflict with recovery and redundancy requirements in this standard.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Phil Sobol, Aquila, Inc		1	It depends on what cyber assets you are talking about. Most SCADA systems and front ends are redundant. However it would be unreasonable to have redundant communication paths to RTUs due to the cost. In most cases the loss of one or two RTUs is not a major problem and can be handled until the problem is corrected. Again, we would recommend referencing NERC Policy 6 Section E.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Richard Kinas, OUC		1	Redundant assets do not necessarily provide additional reliability. Redundant assets should not be required but high availability of the function should be.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Roman Carter, Southern Co. Generation and Energy Marketing		1	This is an availability issue and a Reliability issue more than a Cyber security issue. Redundancy does not necessarily mitigate cyber vulnerabilities. Two systems on the same network can be equally vulnerable, so redundancy does not necessarily equate to better security. Therefore, it should only be required if redundancy can be shown to improve security.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Seiki Harada, BC Hydro		1	It makes sense to provide redundancy for key SCADA /EMS systems. However, I am not sure if we should be designing in redundancies in ALL the cyber assets declared as 'critical'. It may not be economically feasible to prodive redundancy for all components of all critical systems. Also, we may find that some 'critical' systems are 'more critical' than others….	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
William Lucas, WE Energies		1	This really is addressed in section 16 "recovery plan and testing" for the interim standard. Redundancy is an outcome of recovery time objectives that should be established as part of the BCP with system availability determined by the various entities.	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Lyman Schaeffer, PG&E			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Neil Shockey, Southern California Edison			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.			No response	Due to industry concensus opposing this addition to the Cyber Security Standard, no requirements were added to the SAR.

	Comments	
Everett Ernst, OG&E Electric Services	No response	
Jim Hiebert, WECC EMSWG	No response	
Keith Fowler, LG&E Energy Corp.	No response	
Mark A. Creech, Tennessee Valley Authority	No response	
Richard Brooks, Consultant	No response.	
Richard Kinas, OUC	No response	
Alan Boesch, Nebraska Public Power District	The detailed description of the SAR contains a lot of justification that should not be in this section of the SAR. In addition, the requirements intended by the SAR should be spelled out and they are not. The risks and amount of damage that can be done by penetrating each cyber asset should be a factor in the level of security that is required. Physical protection at individual substations may not be feasible given the level of risk that is involved. If a hacker can only attack a local site, less damage can be done. A one size fits all approach to critical cyber assets is not feasible or desired. The SAR should recognize this and provide for such distinctions. The SAR is not real clear on the difference	requirements will be defined in the standard, npot in the sar.The use of risk assessemtn methodolies to identify critical cyber assets has benen added to the sar.
Alan Johnson, Mirant Corporation	Although still have some concerns, believe this SAR is ready to move to the standard development stage where more of the details can be worked out.	Thank you
Allen Chang, BCTC	As the scope of this standards is much more wide-encompassing than the Urgent SAR standards, consideration should be given to allow participants more time to implement the additional requirements.	The standard drafting team will address this through the associated implementation plan.
Bill Wagner, Calpine	Keep it simple. The SAR needs to provide a reasonable level of prevention requirements while encouraging the design and development of standards for a resilient cyber environment that continues to function through adverse conditions/events. For example, the security program should include steps for keeping up with OS security patches and anti-virus profiles (process) and/or installation of a mitigating appliance that buffers the respective system from network based threats while supporting the desired business functionality that is enabled through networked capabilities. Reasonable can be defined as security program ROI does not exceed cost of a "realistic" failure scenario, e.g., equitable magnitude to recent "worst case" blackouts. Ideally, there should be enough latitude in the standard that a company can satisfy these requirements with a mix of operational process and technology to addresses their risk profile within their financial abilities. Finally, the standards development team may consider using a social science context from which to influence and encourage the development and application of technology to address the cyber security issue. This standard is attempting to address a dysfunctional human behavior problem that is an unfortunate reality of our modern society. If everyone played by the rules, linked arms and sang happy songs, this would be a non-issue. The reality is there are groups of people with unethical motives who will exploit communications networks and computer systems for personal gain or to further violent intentions. This is different than the technical realities of the power system running outside of stated frequency tolerances.	Inclusion of risk-based assessment and modifications to definioitjn of critical cyber assets.
Cory Cipra,- Burns & MCDonnell	In general, it is recommended that the SAR be expanded to include distribution providers. As the goal and spirit of the SAR is to address the security, integrity, stability, availability, and reliability of the nation's critical electrical infrastructure, many large security consequences can occur due to pieces of distribution being affected while at the same time not affecting the entire grid. A good example is many distribution providers that cover large metropolitan/regional areas. Also in reference to this, weak downstream security could potentially result in weak upstream security as cyber assets may be interconnected.	Distrib ution entities are not a a NERC-jurisdictional entities.

	Comments	
David McCoy, GPE on behalf of Kansas City Power & Light (KCPL) Cyber Security Task Force	Reliability Functions: Why are the "Purchasing-Selling Entity" and "Market Operator" functions not included? The 2nd paragraph of the Detailed Description seems to indicate that they should be covered. Other: a) A cost/benefit study should be performed along with a threat and vulnerabilities study. Vulnerabilities need to be prioritized and benefits of protection need to be compared with associated costs to prioritize cyber security compliance program elements. For example the cost/benefit of protecting large transmission transformers should be compared to some of these requirements to make certain that efforts are given the appropriate priority. The point is to be sure that standards related to physical electrical system security are pursued with appropriate intensity in parallel with the cyber security standards. Relative risks and benefits of mitigation and costs (between physical and cyber) must be kept in mind as standards are developed. b) The standards need to clearly address 3rd party owners of critical assets and 3rd party contractors. c) 1201 needs to specifically list who the responsible entities are. It should clearly denote whether buyers and sellers of power and distribution providers are governed by this policy. Switching large blocks of load and capacitor banks could have a serious impact on system integrity, so this should at least be addressed, and if these entities are not included, the policy should state specific reasons for their exclusion. d) 1202 needs to list specific examples of critical assets. This standard should also clearly denote whether energy marketing, purchasing and sales systems, tagging, OASIS, scheduling and related operations should be defined as critical. e) 1207 needs to be revised. More specifics are also needed on background checks. What is required? Should these include credit, criminal, DWI, etc and how far back should one search and how often should these checks be performed? f) 1210 needs additional language giving responsible entities assurance that their audit and certification information will remain confidential. There also needs to be language clarifying that sensitive information can be maintained on company servers.	PSE and Market operators are a responsibility of NAESB and the detailed description has been modified. Additionally, at the time that this standard request is recommended to be moved into the stadard drafting phase, NAESB will b e asked to consoider developing a parallel standard for business entities. The specific comments listed under "Other" will be passed to the Standard drafting team.
Gerald Rheault, Manitoba Hydro	High reliability between electronic security perimeters should be required only for critical cyber assets. Non-critical cyber assets (for example, remote monitoring with no control capability or internal station control systems) that do not use public communications media should not be subjected to the same mandated security and documentation requirements. Cyber assets within a generating station or substation that do not communicate outside of that station for control purposes should only require a physical security perimeter and a low level electronic security perimeter (password etc) without extensive documentation requirements. Direction to the standard drafting team on the cyber security standard implementation should be included in the SAR. New purchased systems or upgraded systems must comply once the standard is approved. For existing systems, a proposed implementation timeline, before applying penalties, should be suggested for the standards drafting team, since systems upgrade costs for the responsible entity could be considerable and require a multi-year implementation.	This standard does not address reliability of assets, but cyber security. Perhaps a separate information technology standard that addresses asset reliability should be developed. The SAR already contains implementation plan recommendations that the drafting team believes addresses this comment.
Grant McDonald, Allegheny Energy Group Representative	· Substation RTU's should not be included as a Critical Cyber Asset unless they provide a means to which a compromise of the RTU would allow uncontrolled access to Critical Cyber Assets. · Suggest including a clarification that market functions are excluded from the SAR.· Critical Cyber Asset security measures, as mentioned in the standard, must be flexible enough to allow for differences in facility physical layouts, operational considerations, and geographic boundaries (i.e. substations, power stations, corporate centers). · Suggest eliminating last paragraph of the Detailed Description section of the SAR (page SAR-4) starting with "Reliable data communications….". This paragraph is mixing reliability and security concerns. The elimination of this paragraph is consistent with our response to Questions 2 and 4 above. Furthermore, it appears that the last sentence of the paragraph "Where the data communications…." directly conflicts with the statement in Question 4 that the SAR does not require that SCADA or PCS communications be encrypted.	The definition of critical cyber assets has been modified to clarify this issue. References to market functions have been removed. The last paragraph of the detailed description has been deleted.

	Comments	
Question 6. Other comments regarding the SAR		
Guy Zito, NPCC CP9 Reliability Standards Working Group	NPCC Suggests the following change be made to the following Sections to read as follows: Brief Description: This standard is based on the Urgent Action Cyber Security Standard that was adopted by the NERC Board of Trustees on August 13, 2003. The standard requires that critical cyber assets related to the **real-time** reliable operation of the bulk electric systems are identified and protected. Requirements will be included in the standard for responsible entities to create and implement **security** programs and procedures, perform on-going effective assessments, and implement appropriate and technically feasible improvements necessary to meet the requirements of this standard to insure cyber-security. Security programs include the responsible entity's policies, standards, procedures, training, and auditing controls for the implementation of this standard. The standard is intended to replace the Urgent Action Cyber Security Standard. Detailed Description: (starting with 2nd paragraph): Reliable bulk electric system operations are highly interdependent, and the failure of key/critical elements of the generation, transmission, or grid management system can potentially compromise the reliable operation of major portions of the regional grid. Similarly, the wholesale electri transactions and interdependencies, relies on the continuing reliable operation of not only physical grid resources, but also the operational infras monitoring, dispatch, and market software and systems. Because of this mutual vulnerability and interdependence, it is necessary to safeguard assets that support bulk electric system operations. by establishing standards to provide a level of assurance that even a single compromise of asset does not compromise system security, and, thus, risk grid or market failure. This standard shall primarily focus on electronic systems including: hardware, software, data, related communications networks, and control sys This standard shall require that entities identify and protect critical cyber assets related to the reliable operation of the bulk electric system and h Detailed Description (6th paragraph): Reliable and secure data communications networks are key to continuity of operational control and ongoing management of critical cyber asset Definitions Section: (NPCC Suggests the existing language read as follows) Security Incident: Any physical or cyber event of possible malicious or **suspected to be of malicious**unknown origin that disrupts the functional operation of a critical cyber asset or compromises the electronic or physical security perimeters.	The brief description and detailed description sections have been modified to reflect changes suggested in this comment and other comments The definition of Security Incident has also been modified.
Jack Hobbick, Consumers Energy	Narrow the focus to those assets that directly affect the reliability of the grid, specifically cyber assets that can impact multiple physical locations vs. those cyber assets that can only impact a single physical location Ensure that any future standard is coordinated with Department of Homeland Security requirements. Endeavor to tightly restrict the scope of the cyber security standard to security. Avoid setting reliability standards (Items 2,3, and 5) as part of the security standard, this will defer attention away from critical security issues.	Modified the definitions of critical cyber assets. DHS has no current requirements, they will have to be considered by a future drafdting team. All reliability/availability measures have been removed.
Jim Cyrulewski, International Transmission Company	Why wasn't Principal 4 checked?	Due to the limited impact this would have on the bBES, and the time required to justify addding this principle. The drafting team chose not to include it. Each entity is certainly free to extend the use of the standard to other groups within the organization.
Joe Weiss, KEMA	1. Distribution providers should be included since many large transmission substations also include distribution equipment that often communicate with transmission devices (and vice versa) making them equally cyber vulnerable. Additionally, DOE tasked NERC to address the electric utility industry- this includes distribution. 2. Market operators should be included per the second paragraph of the detailed description and also because they are part of the electric industry. Encryption should not be required until is it confirmed by testing that encryption is the appropriate technology to meet the required functional needs. This has not yet occurred.	NERC has no authority over distribution entities. Those entities are certainly free to use the standard. Market operations are a responsibility of NAESB. References to encryption have been removed from the SAR
John G. Maguire, PJM Interconnection, LLC	The entire last paragraph of the Detailed Description should be removed as, in conjunction with comments above, it does not contribute to the scope of the standard.	Done

	Comments	
John Horakh , MAAC	In the Purpose / Industry Need section, add the word "data", to read as follows: "To protect the critical cyber assets (computers, software, data, and communications networks) essential to the reliability of the bulk electric system. B. In the Brief Description section, add words to make the third sentence read as follows: "Requirements will be included in the Standard for responsible entities to create and implement at least minimum level programs and procedures, to perform ongoing assessments, and to implement …. etc" The Standard should do a lot more than requiring responsible entities to have and implement' some sort of cyber security program. There should be some minimum level, measurable program required. C. In the Detailed Description section, move the word minimum, and add words, in the first sentence. The sentence would then read: "This Standard identifies the requirements to implement and maintain at least a minimum level cyber security program to protect cyber assets critical to reliable bulk electric system operation". See Comment B. above.	Data has been added. The brief and detailed descriptions have been modified to reflect this and other comments.
John Lim, Con Edison	This SAR should scope the standard so that it does not include requirements which cannot be met using technical solutions available today. As much as possible, it should make scope requirements in terms of functions or objectives, rather than technologies used to achieve these functional objectives.	So noted.
Karl Tammer, ISO/RTO Council - Standards Review Committee	1. Under "Detailed Description", 3rd paragraph, 1st sentence – in order to ensure SCADA monitoring functionality is included, revise to: "This standard shall primarily focus on electronic systems including: hardware, software, data, related communications networks and monitoring and control systems…" 2. Under "Detailed Description", 3rd paragraph, delete the sentence beginning "This standard shall require that third-party…" as it is too limiting and add to the last sentence "This standard shall require that the responsible entities that must comply with the standard identify and protect themselves from threats from other connected cyber systems, including those provided by contractors and service providers." 3. Delete the last paragraph entirely, as it adds nothing to the scope or intent of the SAR. Further, it includes a level of detail that is inappropriate for a SAR, but would be more appropriate in the standard itself.	The detailed description has been modified to reflect this and other comments.
Kathleen Goodman, ISO-NE	1. Under "Detailed Description", 3rd paragraph, 1st sentence – in order to ensure SCADA monitoring functionality is included, revise to: "This standard shall primarily focus on electronic systems including: hardware, software, data, related communications networks and <u>monitoring and</u> control systems…" 2. Under "Detailed Description", 3rd paragraph, delete the sentence beginning "This standard shall require that third-party…" as it is too limiting and add to the last sentence "This standard shall require that the responsible entities that must comply with the standard identify and protect themselves from threats from other connected cyber systems, including those provided by contractors and service providers." 3. Delete the last paragraph entirely, as it adds nothing to the scope or intent of the SAR. Further, it includes a level of detail that is inappropriate for a SAR, but would be more appropriate in the standard itself.	The detailed description has been modified to reflect this and other comments.
Keith Comeaux, CLECO Power	This standards scope is broader than the current one and would like to see a phase-in period to implement the new standard. * What sanctions are to be attached for non-compliance?	The implementation plan and sanctions for non-compliance are developed by the standard drafting team.
Kevin B. Perry, Southwest Power Pool	The entire last paragraph of the Detailed Description should be deleted. This section defines a technical approach or technical design requirements that have no business in a security standard. The scope of this cyber security standard should be limited to critical cyber systems typically found in the utility operations center and should not attempt to include systems found in substations or generation plants. Plant/substation systems are different in their design, functionality, and protection requirements and should be addressed in a separate security standard specific to their needs. Trying to address every conceivable system in one standard introduces confusion and diminishes the overall effectiveness of the standard.	The definitions of cyber assets and critical cyber assets have been modified. A definition for bulk electric system asset has been added.The detailed description has been modified to reflect this and other comments.

	Comments	
Larry Conrad, ECAR Critical Infrastructure Protection Panel	Realistically ensuring that each of the Reliability Functions specified in the latest revision of the SAR complies with the standards already defined in the Urgent Action Standard 1200 - Cyber Security will require 12 - 24 months. Broadening the scope to include 99.5% availability per annum for all data communications joining 'two or more critical cyber assets' and encryption of all data communications utilizing public networks in the same time frame constitutes an arduous burden. While we recognize that reliability of networks is important, reliability should be handled as a separate SAR to update Policy 7. Adding reliability to this SAR will substantially increase the complexity and delay standard development. This will develop standards and prescribe time frames that are more realistic. Further, we feel that technology should not be introduced for technologies sake. Prescribing the broad use of encryption for all data communications that traverse public network resources fails to recognize the relative risk associated with the various communications involved. For example, encryption of closed loop data traffic to and from a RTU offers protection, but the risk associated with not protecting communicati On a technological note, we also feel that stronger authentication and verification of critical cyber devices in the absence of, or in conjunction with, encryption would greatly enhance the integrity of data communications. Encrypting data communication traffic between weakly authenticated or identified devices is of limited value. While encryption does offer protection against 'sniffing', without strong authentication rogue devices using 'spoofed' addresses are still a threat.	All references to reliability and availability have been removed as well as references to the use of encryption.
Lloyd Linke, MAPP Regional Reliability Council, assisted by the MAPP Operations Subcommittee	The requirements should be set out in this SAR in a clear manner. Industry Standards based risk analysis processes must be incorporated into this standard, as a guide for Cyber Asset Owners to provide prudent and justifiable means to determine the level of risk and subsequent necessary protective measures to be applied to their Cyber Assets.	The SAR does not establish the specific requirements, that is accomplished in the standard drafting phase. A reference to the use of risk analysis has been added to the SAR.
Lyman Schaeffer, PG&E	The proposed SAR references building off the comments provided as part of the Emergency Action SAR. The most controversial portion of that document (as measured by the number of questions and comments) involved questions about implementing background investigation requirements for existing employees. That issue alone had the potential to defeat the Emergency Action SAR. This document is silent on that issue. Given the above history and the nature of the SAR process, we believe that this document should state what the intentions are in this area and how it will be addressed as part of the process. Failure to address this issue properly will risk the defeat of a permanent standard when it is finally issued. Detailed Description portion: We are concerned that the underlying premise of the document is too broad. The sentence stating that standards are required to "provide a level of assurance that even a single compromise of a critical cyber asset does not compromise system security, and thus, grid failure" seems overly ambitious and impractical. If the intent of the SAR is to create a perfect world, this effort will result in failure at enormous cost. At the end of this section, the proposed SAR references a requirement for encryption of data under certain circumstances. However, we have some concerns that the state of development of encryption technology today would not be sufficient to accomplish that measure within the requirements of real time operations. Inclusion of that requirement may well force companies to use inadequate technology and result in serious degradations of operating systems.	The SAR is a scoping document. The requirements will be developed by the standard drafting team based on what is already in the UA Standard. The indicated statement has been modified. References to the use of encryption have been removed.

	Comments	
Marcus W. Nichols,Omaha Public Power District	As mentioned previously, the scope of this SAR greatly expands the definition of critical cyber assets, far beyond the requirements in the Urgent Action Request. If these expanded definitions remain unchanged, electric utilities will not be able to fully comply with them for at least 10 years.

The detailed description of the SAR contains a lot of justification that should not be in this section of the SAR. In addition, the requirements intended by the SAR should be spelled out and they are not. The risks and amount of damage that can be done by penetrating each cyber asset should be a factor in the level of security that is required. Physical protection at individual substations may not be feasible given the level of risk that is involved. If a hacker can only attack a local site, less damage can be done. A one-size fits all approach to critical cyber assets is not feasible or desired. The SAR should recognize this and provide for such distinctions.

Our concern is that the standard uses a one-size fits all approach to critical cyber assets, no matter what the risk is to the interconnected system. Utilities must take steps to protect cyber assets, but the same levels of security are required in a substation as at the Control Center. I

In paragraph 3, requiring third-party providers of services (e.g. OASIS, System Suppliers, etc.) to comply with this standard may be beyond the

Finally, the last sentence in the last paragraph is unreasonable. Requiring that all data utilizing shared public network resources…be encrypted | The definitions of cyber asset and critical cyber asset have been refined and references to the use of risk-based analysis have been added for identifying an entity's critical cyber assets. The third paragraph has been modified to reflect this and other comments. The references to reliability and availabiliuty have been removed. |
| Neil Shockey, Southern California Edison | As with Urgent Action Standard 1200, this SAR is unclear on its applicability to nuclear facilities. The SAR and permanent standard should explicitly exclude nuclear facilities, as this segment of the industry is governed by NRC regulations/standards. The drafting team's response to SCE's concern with this in standard 1200 ("Nuclear plants are not subject to this standard") should be explicitly stated in the SAR and permanent standard to prevent any misinterpretation that nuclear facilities would be subject to the permanent standard. | The brief description has been modified to include an exclusion for nuclear facilities. |
| Patti Metro, FRCC | Comments Regarding Reliability Functions Portion of SAR:
In the following excerpt "…Similarly, the wholesale electric market, as a network ofeconomic transactions and interdependencies, relies on the continuing reliable operation of not only physical grid resources, but also the operational infrastructure of monitoring, dispatch, and market software and systems…" if this is included in the SAR shouldn't the Market Operator and PSE be included as applicable entities? Please provide clarification on why this SAR is applicable to the LSE.

Comments Regarding Applicable Reliability Principles:
Since the SAR deals with information availability in a secure manner. It has to get to the System Operators, therefore, should include #3.
Since the SAR does not address or impact the System Operators training, qualification,responsibility or authority. Even if a background check is required, it does not affect the principles listed, therefore, should NOT include #6.

Comments Regarding Detailed Description Portion of SAR: There are several terms used in this portion of the document that require more clarity and are technical terms that should either be included in the SAR
or a supplemental glossary of terms:
· non-repudiation·

·In the following excerpt: "... set forth in the standard as they relate to governance..." what is
the intent with regard to governance?

·In the following excerpt "…and control systems as they impact bulk electric system operations
and personnel …" what is meant by personnel?

It is important that this SAR focus on cyber security issues related to transmission SCADA systems.
The addition of redundancy, availability, backup and recovery should be developed in specific standards
on those topics. If there is a continuous effort to add more requirements and expand the scope of
Cyber Security Standard, the SAR process and the Standards drafting will be prolonged and it will be
difficult to gain an industry consensus. If it is the intent of NERC and the Drafting team to include all of
the requirements that were discussed on this comment form into one standard, then the standard should
be renamed to Cyber Operation Control Standards to reflect a scope that is beyond cyber security. | Market entities (PSE, Market Operators) are the responsibility of NAESB, LSE's are the responsibility of NERC.NAESB will be asked to consider developing a parallel standard for market entities. Also the paragraph referenced has been modified to remov references to market entities.

This is not an information security standard, therefore item #3 is not checked. Because access to critical cyber assets is a necessity of the system operations folks, box #6 is checked.

References to the use of encryption have been removed, thus removing the use of non-repudiation.

Governance refers to program management, planning and oversight.

The referenced excerpt has been modified to add clarity

References to availability and reliability have been removed from this SAR and will likely be addressed in a separate SAR at a later date. The standard drafting team will be advised of this concern and it will be recommended that they coordinate development of this standard with other standard development work in this area. |
| Phil Sobol, Aquila, Inc | Our concern is the data encryption requirements placing an undue cost burden on the industry with out offering any real value.   My concern is establishing un-realistic requirements which are of no, or limited value. Putting too much on the table too soon will result in too many errors and possible failures to comply. The cyber assets should first be prioritized and then work from there. Prioritization should come from the industry with guidance from the various security sectors. | References to the use of encryption have been removed. |

	Comments	
Robert Metcalf, MidAmerican Energy Company	It would be beneficial for our planning purposes to know what the final cyber security standard will look like. Presumably this is just the first step of an evolving standard. If we had the complete plan in front of us, even if it was a staged implementation, we would be making more efficient investment decisions in our cyber infrastructure.	The standard development process is an interative process and the drafting of the SAR (scope document) is only the first phase. The implementation plan will be developed by the standard drafting team at the appropriate time in the development cycle.
Roman Carter, Southern Co. Generation and Energy Marketing	Encryption should not be required until it is confirmed by testing and industry agrees it is required to meet security needs. This Standard is much more wide-encompassing than the Urgent Action Standard. Therefore, it will need to provide ample lead time for all participants to implement any additional requirements." The nuclear industry is already developing its own initiatives to perform Cyber Security assessments and measures at nuclear facilities. These are being addressed through the NRC and the Nuclear Energy Institute (NEI). Therefore, nuclear plant systems should be specifically excluded from the scope of this NERC standard."	References to encryption have been removed from this SAR. The implementation plan will be developed by the standard drafting team at the appropriate time in the development cycle. The brief description has been modified to include an exclusion for nuclear facilities.
Seiki Harada, BC Hydro	This set of standards is much more wide-encompassing than the Urgent SAR standards. We will need to give sufficient lead time for all participants to implement the additional requirements.	The implementation plan will be developed by the standard drafting team.
Stuart Brindley, IMO (Ontario)	1st sentence – in order to ensure SCADA "monitoring" functionality is included, revise to: "This standard shall primarily focus on electronic systems including: hardware, software, data, related communications networks and monitoring and control systems…" · Delete the sentence beginning "This standard shall require that third-party…" as it is too limiting and, instead, add to the last sentence "This standard shall require that the responsible entities that must comply with the standard identify and protect themselves from threats from other connected cyber systems, including those provided by contractors and service providers." · Delete the last paragraph entirely, as it adds nothing to the scope or intent of the SAR. Further, it includes a level of detail that is inappropriate for a SRA, but would be more appropriate in the standard itself.	The detailed description has been modified to capture these comments.
Wayne R. Mackenzie, VELCO – Vermont Electric Power Co.	The SAR needs to be completed so that it does not leave islands of critical bulk transmission cyber assets that are not protected under this SAR. Market Systems, SCADA Masters, EMS systems, Generators, local control systems and ICCP systems where these systems cyber security failures may affect the reliable operation of the bulk transmission system need to be included. While the current definition could be interpreted to include all of these systems there are several comments to reduce the scope of this definition or move some systems into separate SARs. Any of the above systems (and some others) may need specific detail, but should remain part of this SAR insofar as they can negatively impact the reliability of the bulk transmission system through cyber security events.	Where the systems mentioned meet the definitoins of this SAR, they will be required to comply with the standard. Some systems, such as market systems are outside the purvue of NERC and NAESB will be asked to consider developing a parallel standard.
William Lucas, WE Energies	Primary focus should be energy management systems and their respective interconnections with other control entities. Any system using network routable protocol should be considered. Getting external communications carriers to comply with the standard may not be achievable. A blanket assumption requiring encrypted carrier based circuits may be too restrictive. One could argue that point-to-point circuits have no access from the public, therefore do not need encryption. The statement of 'leased-permanent' implies a DS1/DS3 line for internet access, as point-to-point circuits do not use the 'shared public network' resources (bottom of page SAR-4). Provide more definition and clarification around these terms. Phase-in time should be identified (is this for new systems or all systems?). Getting the EMS and SCADA vendors to comply with the standard will take some time, depending on interpretation of what needs encryption.	Definitions of cyber assets sand critical cyber assets have been modified to add clarity. References to raliability and availability of communications facilities have been removed from this SAR, as have references to encryption. The implementation plan will be developed by the standard drafting team.