5.10 CUSTOMER SPECIFIC DESIGN AND ENGINEERING SERVICES (L.34.1.5)

Qwest's Networx Customer Specific Design and Engineering Services provide systems and applications test facilities domestically and non-domestically and uses time-proven processes for delivery to Agencies.

Qwest will provide skilled, experienced, and dedicated personnel; systems and applications test facilities; and time-proven processes to deliver Customer Specific Design and Engineering Services (CSDES) to Federal Government Agencies. Qwest will provide CSDES technical support that includes, but is not necessarily limited to: requirements engineering and change control; vendor technology analysis, systems, and applications design; vendor products assessments and selection; performance and cost benefits analysis; and systems implementation and testing of network equipment and applications.

Our CSDES support will be available to Agencies domestically and non-domestically, as specified in a Statement of Work (SOW) or task order (TO). [redacted] For consistent quality and depth of our CSDES, Qwest Networx Team members hold and sustain corporate certifications, including International Organization for Standardization (ISO) 9000 and Capability Maturity Model Integration (CMMI) Level 5, and bring to bear expertise in a wide range of leading-edge technologies in networks and networking (for example, optical, wireless, data, and packet; servers; Web hosting; application development; network operations; and systems management).

Figure 5.10-1 provides an easy reference to correlate narrative requirements to our proposal response.

Figure 5.10-1 Responses to Narrative Mandatory Service Requirements

Req_ID	RFP Section	RFP Requirement	Proposal Response
3821	C.2.11.9.1. 4 (1) (a)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: a. Requirements gathering, definition, and analysis.	5.10.1.1.1
3820	C.2.11.9.1. 4 (1) (b)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: b. Development of specifications.	5.10.1.1.2
3819	C.2.11.9.1. 4 (1) (c)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: c. Development and evaluation of alternative technical approaches.	5.10.1.1.3
3818	C.2.11.9.1. 4 (1) (d)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: d. Computer aided design, modeling and/or simulation.	5.10.1.1.4
3817	C.2.11.9.1. 4 (1) (e)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: e. Network design recommendations.	5.10.1.1.5
3816	C.2.11.9.1. 4 (1) (f)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: f. Identification of cost and performance tradeoffs.	5.10.1.1.6
3815	C.2.11.9.1. 4 (1) (g)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: g. Feasibility and capacity analysis.	5.10.1.1.7
3814	C.2.11.9.1. 4 (1) (h.)	1. The contractor shall provide network architecture design services. This shall include but is not limited to technical support to assist Agencies with network architecture planning and design, solutions development, and the identification and evaluation of network	5.10.1.1.8

Req_ID	RFP Section	RFP Requirement	Proposal Response
		solutions and technologies to meet Agency business concepts and requirements. Tasks associated with this activity can include: h. Preliminary planning.	
3812	C.2.11.9.1. 4 (2)	2. The contractor shall provide network and related systems design validation. The contractor shall review and validate the design of existing or proposed networks, related services, and systems identified by the subscribing Agency.	5.10.1.1.9
3810	C.2.11.9.1. 4 (2) (a)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: a. Assessment of network strengths, weaknesses, and vulnerabilities.	5.10.1.1.10
3809	C.2.11.9.1. 4 (2) (b)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: b. Capacity and traffic pattern analysis on current and projected traffic loads.	5.10.1.1.11
3808	C.2.11.9.1. 4 (2) (c)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: c. Measurement and assessment of network performance and availability.	5.10.2.2.1
3807	C.2.11.9.1. 4 (2) (d)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: d. Recommendations for network optimization, simplification, or cost reduction.	5.10.1.1.12
3806	C.2.11.9.1. 4 (2) (e)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: e. Identification of critical applications, protocols and vital data impacting the network.	5.10.1.1.13
3805	C.2.11.9.1. 4 (2) (f)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: f Network discovery including development of a topology map.	5.10.1.1.14
3804	C.2.11.9.1. 4 (2) (g)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: g. Development of strategies to improve reliability, availability, and security.	5.10.1.1.15
3803	C.2.11.9.1. 4 (2) (h)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: h. Develop and validate current infrastructure drawings/schematics.	5.10.1.1.16
3800	C.2.11.9.1. 4 (2) (i)	2. The review shall include but is not limited to network performance, routing, IP addressing, numbering plans, physical/logical redundancy and diversity, network equipment, security, interoperability, and scalability. Tasks associated with this activity can include: i. Validate service interoperability with other networks and systems.	5.10.1.1.17
3799	C.2.11.9.1.	3. The contractor shall evaluate network technologies alternatives	5.10.1.1.18

Req_ID	RFP Section	RFP Requirement	Proposal Response
	4 (3)	and approaches to meet Agency requirements.	
3797	C.2.11.9.1. 4 (4)	4. The contractor shall perform modeling and simulation of applications and network services prior to implementation in a production environment.	5.10.1.1.19
3794	C.2.11.9.1. 4 (5)	5. The contractor shall ensure rigorous and thorough testing is performed under a controlled test bed environment or the contractor's production network, according to subscribing Agency's needs, to verify and evaluate the suitability and compatibility of new services.	5.10.1.1.20
3793	C.2.11.9.1. 4 (5)	5. The contractor shall validate and verify that the services and/or applications under test operate according to the Agency's requirements and objectives.	5.10.1.1.21
3791	C.2.11.9.1. 4 (6) (a)	6. The contractor shall provide technical support to facilitate the transition of services into a sustainable pilot or production service that operates on the Agencies networks. Tasks associated with this activity can include: a. Evaluation of the impact of new services upon Agency networks.	5.10.1.1.22
3789	C.2.11.9.1. 4 (6) (b)	6. The contractor shall provide technical support to facilitate the transition of services into a sustainable pilot or production service that operates on the Agencies networks. Tasks associated with this activity can include: b. Development of transition plans.	5.10.1.1.23
3834	C.2.11.9.1. 4 (6) (c)	6. The contractor shall provide technical support to facilitate the transition of services into a sustainable pilot or production service that operates on the Agencies networks. Tasks associated with this activity can include: c. Implementation support.	5.10.1.1.24
3833	C.2.11.9.1. 4 (6) (d)	6. The contractor shall provide technical support to facilitate the transition of services into a sustainable pilot or production service that operates on the Agencies networks. Tasks associated with this activity can include: d. Development of test and acceptance plans and criteria.	5.10.1.1.25
3832	C.2.11.9.1. 4 (6) (e)	6. The contractor shall provide technical support to facilitate the transition of services into a sustainable pilot or production service that operates on the Agencies networks. Tasks associated with this activity can include: e. Measurement and assessment of network performance.	5.10.1.1.26
3831	C.2.11.9.1. 4 (7) (a)	7. The contractor shall provide design and engineering services for engineering prototypes relative to Networx services to include but are not limited to a. Installation of network hardware and software.	5.10.1.1.27
3830	C.2.11.9.1. 4 (7) (b)	7. The contractor shall provide design and engineering services for engineering prototypes relative to Networx services to include but are not limited to b. Configuration of network devices such as routers, switches, and gateways.	5.10.1.1.28
3829	C.2.11.9.1. 4 (7) (c)	7. The contractor shall provide design and engineering services for engineering prototypes relative to Networx services to include but are not limited to c. Installation of on-premises cable and network drops.	5.10.1.1.29
3828	C.2.11.9.1. 4 (7) (d)	7. The contractor shall provide design and engineering services for engineering prototypes relative to Networx services to include but are not limited to d. Performing testing and acceptance procedures.	5.10.1.1.30

5.10.1 Technical Approach Customer Specific Design and Engineering Service Delivery (L.34.1.5.1)

The Qwest Team approach for delivering CSDES provides skilled personnel and time tested engineering processes for fulfilling services to Agencies.

5.10.1.1 Approach to Customer Specific Design and Engineering Service Delivery (L.34.1.5.1)

Qwest will respond to and work directly with Agency managers and engineers to review the technical and functional scope of needed CSDES. We will develop design recommendations based on engineering assessments of the defined performance objectives. We will then translate our findings (presented in a report format consistent with Agencies' needs) into tested and validated solutions ready for Agency approvals and rapid implementation. The duration of this process will vary, depending upon solution scope and complexity.

Throughout the contract lifecycle, our CSDES services will employ industry certified and time tested systems engineering processes and standards, as well as employment of Qwest test laboratories. [redacted]

[redacted]

Testing done by the Qwest labs includes performance tests, conformance tests, and regression tests for new equipment, as well as existing equipment in the network. Qwest's test environments [redacted]

Qwest test laboratories play a vital role in the design and engineering process. They serve as the conduit between engineering, planning, and operations to ensure that new platforms are fully tested. This includes validation that any new platform, architecture, or technology introduced into the production network will not disturb normal operations and will not cause any network-wide outages. The Qwest lab collaborates closely with internal and external teams to ensure that all introductions are successful and well supported.

[redacted]

Qwest will respond to Government SOWs by providing proposals with a range of carefully selected engineering service recommendations that will satisfy required goals, and a schedule for service delivery. Such CSDES

support can be acquired over a range of Networx relevant disciplines as needed by a particular SOW.

[redacted]

Each of these is representative of a subset of the industry standard systems engineering approach that consists of [redacted]

[redacted]

The CSDES process may be considered cyclical in that, at some point in time, a deployed system becomes obsolete due to technology advances, new requirements, or other factors. This suggests the need to repeat CSDES processes, thus defining the systems engineering (SE) lifecycle of a particular

system. There are a number of SE lifecycle models relevant to anticipated Networx CSDES challenges. Recursive lifecycle models are best for design and deployment of new technology. [redacted] depicts the high level, cyclical nature of SE process with recursive loops to fine tune the end solution to meet operational requirements.

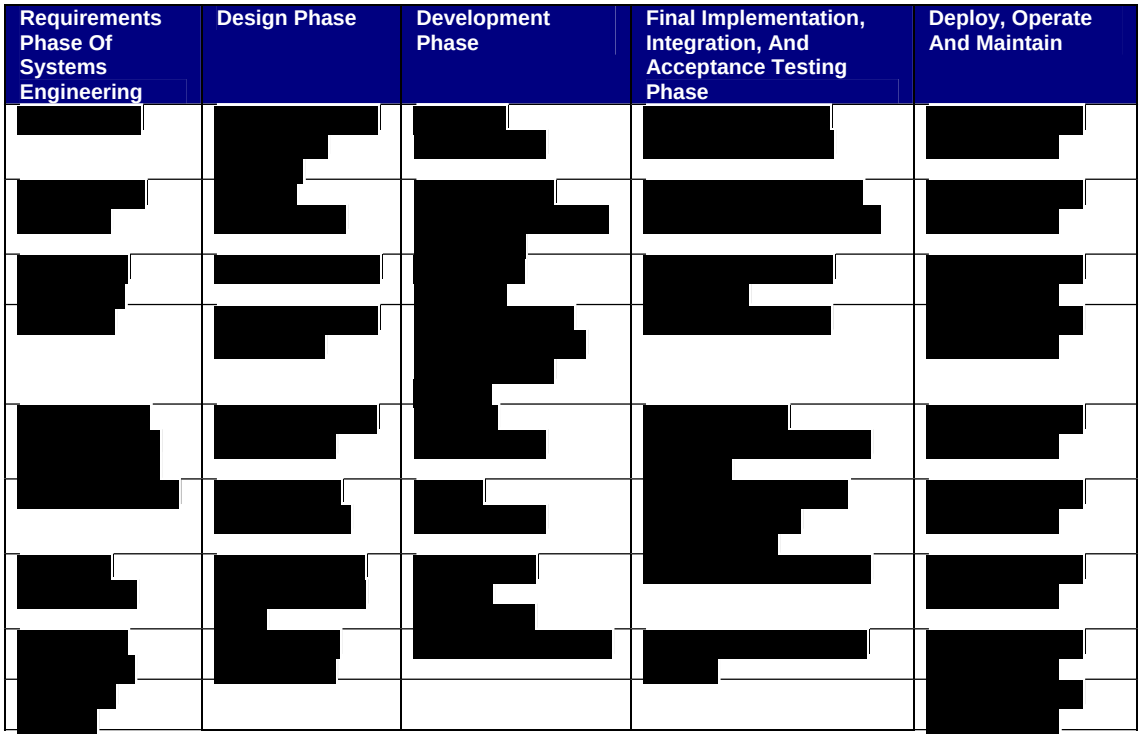
A key element of the SE lifecycle is the periodic formal review of system status; our CSDES proposals will typically suggest such reviews during and subsequent to performance. The exit criteria for the above processes are the formal status reviews with the Agency and the approval to proceed with various phases of a CSDES TO.

Network design validation is a sub-process of the design function, and simulation and testing are functions that support the development of technical specifications and validation of the design. Equipment and applications testing on a live network constitute testing of the developed solution pending formal Government acceptance testing; it represents a sub-function of the integration and test process. Engineering support cuts across all aspects of the SE process.

Network architecture design and implementation involves all aspects of the SE process. Architectures are an output product of the requirements phase of SE. The output of the requirements phase is the network architecture and a top-level network specification, which becomes the input to the design phase. The exit criterion is a formal requirements readiness review and approval. [redacted]

Qwest recognizes that various applicable standards will be specified in the CSDES TO. We will comply with applicable standards throughout a CSDES SOW process. We also recognize that connectivity requirements will be specified in a specific Agency's CSDES SOW. We will develop our solution to fully meet such requirements.

Figure 5.10.1-2 Qwest's CSDES Process with Phases



5.10.1.1.1 Requirements Gathering, Definition, and Analysis (Req_ID 3821; C.2.11.9.1.4 (1)(a))

Qwest will work with Agencies to understand the requirements, and then to translate them into options for network solutions or technologies. These requirements will then be documented with the definitions and alternatives for resolution. [redacted]

5.10.1.1.2 Development of Specifications (Req_ID 3820; C.2.11.9.1.4 (1) (b))

Qwest will use the agreed-upon requirements and will develop the specifications to meet those requirements. The work here could involve hardware/software vendors or could remain internal to Qwest and the Agency if the development is done solely by Qwest. Requirements and specifications from prior projects will be used as much as possible to reduce cycle time and cost.

5.10.1.1.3 Development and Evaluation of Alternative Technical Approaches (Req_ID 3819; C.2.11.9.1.4 (1) (c))

Qwest will develop different alternatives for a given set of requirements and specifications. These alternatives will be evaluated based on costs, timelines, impacts to operations, and other criteria as needed. A decision matrix will be then be used to select the most feasible option.

5.10.1.1.4 Computer Aided Design, Modeling, and/or Simulation (Req_ID 3818; C.2.11.9.1.4(1)(d))

Part of the evaluation process will include use of computer aided design (CAD), modeling, and/or simulation. Results from any simulation testing may determine the next steps for a project. Results from testing done solely via software may not always be sufficient for evaluation. These simulated results may be augmented with lab testing via physical hardware to yield more complete analysis.

5.10.1.1.5 Network Design Recommendations (Req_ID 3817; C.2.11.9.1.4 (1) (e))

Based upon the Agency's requirements, network architecture options, and results of testing (simulated and physical), Qwest will develop recommendations for network design. This recommendation will be based on the decision matrix that includes cost, timelines, impacts to operations, testing

results, and other criteria as jointly identified with the Agency. A recommendation review will be conducted with the Agency to validate the analysis, determine if there are any other factors, and determine next steps.

These network architecture options will be put into an SE design package. The package will include items such as:

[redacted]

5.10.1.1.6 Identification of Cost and Performance Tradeoffs (Req_ID 3816; C.2.11.9.1.4 (1)(f))

Qwest will work with the Agency to ensure that the appropriate costs, performance tradeoffs, operational impacts, deployment issues, and any other pertinent factors are identified. With the in-depth knowledge and experience of our engineers and architects, much of this information has already been documented from prior projects. Leveraging this knowledge base will reduce the time and cost to identify these items.

5.10.1.1.7 Feasibility and Capacity Analysis (Req_ID 3815; C.2.11.9.1.4 (1)(g))

Qwest will analyze all architecture and designs for feasibility and cost of enabling the capacity. [redacted]

5.10.1.1.8 Preliminary Planning (Req_ID 3814; C.2.11.9.1.4(1)(h))

[redacted]

5.10.1.1.9 Network and Related Systems Design Validation (Req_ID 3812; C.2.11.9.1.4 (2))

Qwest will evaluate designs and proposals using both simulated and physical testing. Network Systems Design Validation consists of several steps:

[redacted]

[redacted]

Given all of the above, combined with Qwest's multiple lab locations and interconnections, we will be able to quickly validate if the design or proposal is feasible. In some circumstances, physical testing will need to be performed. With the wide array of equipment in the Qwest test bed, the physical testing will be accommodated with little delay or modification. In addition, Qwest has a well proven process for integrating new platforms into the testing environments as required.

5.10.1.1.10 Assessment of Network Strengths, Weaknesses, and Vulnerabilities (Req_ID 3810; C.2.11.9.1.4(2)(a))

During the planning phase, Qwest will identify all major components of the network. Based on this analysis, Qwest and the Agency will review the different options, comparing the options' strengths, weaknesses, and vulnerabilities. After the review, the Agency can then make the appropriate decision regarding the deployment.

5.10.1.1.11 Capacity and Traffic Pattern Analysis on Current and Projected Traffic Loads (Req_ID 3809; C.2.11.9.1.4(2)(b))

Critical factors in any network design include the volume of traffic and the traffic pattern. Using simulation tools, Qwest will show the Agency the impact of current and future traffic volumes on the design. [redacted] The simulations and tests will verify that the network design is adequately robust and adaptable to the changes in traffic volume.

5.10.1.1.12 Recommendations for Network Optimization, Simplification, or Cost Reduction (Req_ID 3807; C.2.11.9.1.4(2)(d))

Qwest applies a Program Management approach that encompasses all aspects of the lifecycle of a program. This includes understanding the current network design, evaluating all aspects of the network including Internet design (e.g., routing, IP addressing, and security), circuit design (e.g., physical and logical path and route diversity, network redundancy), as well as all aspects of interoperability with other providers and services, and finally the ability for the network to grow to meet an Agency's expanding requirements. Qwest will both respond to direct requests by an Agency to analyze and make suggestions with respect to the optimization (i.e., cost reduction, simplification, robustness). In addition, [redacted]

[redacted]

Examples of the results of these analyses would include:

[redacted]

[redacted]

5.10.1.1.13 Identification of Critical Applications, Protocols, and Vital Data Impacting the Network (Req_ID 3806; C.2.11.9.1.4(2)(e))

A network design is not complete without the proper understanding of the applications that are using the network. During the requirements gathering phase, Qwest will work with the Agency to identify all applications, critical and non-critical, that will be using the network. Qwest will recommend the network protocols to use to support these applications. The entire network design will be customized for these applications and the data required for proper operation. Examples include:

[redacted]

5.10.1.1.14 Network Discovery and Topology Map (Req_ID 3805; C.2.11.9.1.4(2)(f))

Qwest will use tools and interviews to determine the network topology for the Agency. Depending on the specific Agency's security levels, Qwest will determine the appropriate mechanisms to gather this topological information. [redacted] In addition, customer network operations personnel will be key contributors to this effort. Once the topology is created, it will become part of the network design.

5.10.1.1.15 Development of Strategies to Improve Reliability, Availability, and Security (Req_ID 3804; C.2.11.9.1.4(2)(g))

As the network design is being built and continuously evaluated, Qwest will create strategies and action plans to improve the network's reliability and availability. These strategies could involve re-grooming the network facilities, adding new links, or upgrading technology. Qwest will work with the Agency's network team to make sure that the network security is being continuously evaluated and improved upon.

Qwest has performed studies, developed strategies, made recommendations, and implemented network improvements to create a more robust infrastructure for a customer's network. [redacted]

Strategies include:

[redacted]

5.10.1.1.16 Development and Validation of Current Infrastructure Drawings and Schematics (Req_ID 3803; C.2.11.9.1.4(2)(h))

As the network topology map is being created, Qwest will work with the Agency to get the current infrastructure drawing, schematics, and network design[redacted]

5.10.1.1.17 Validation of Service Interoperability with other Networks and Systems (Req_ID 3800; C.2.11.9.1.4(2)(i))

[redacted]

Qwest regularly leverages our Integration and Test Facilities to perform interoperability testing as well as testing of new features and technologies that may add value to an Agency's network.

5.10.1.1.18 Evaluation of Network Technologies Alternatives and Approaches to Meet Agency Requirements (Req_ID 3799; C.2.11.9.1.4 (3))

[redacted]

5.10.1.1.19 Modeling and Simulation of Applications and Network Services (Req_ID 3797; C.2.11.9.1.4 (4))

As part of our normal procedures, Qwest will perform testing of applications and services in a simulation of the Agency's environment within the Qwest labs.

5.10.1.1.20 Testing for Suitability and Compatibility of New Services (Req_ID 3794; C.2.11.9.1.4 (5))

[redacted]

[redacted]

5.10.1.1.21 Operation of New Services According to the Agency's Requirements and Objectives (Req_ID 3793; C.2.11.9.1.4(5))

Qwest's Networx Services Verification Test Plan will detail the standard test procedures that are used by the Agency to verify that the services delivered under the contract meet the Key Performance Indicator (KPI)/Acceptable Quality Level (AQL) thresholds for the ordered service as specified in Section C.2, Technical Requirements, prior to delivering the ordered service to the Agency. [redacted]

Qwest will use standard acceptance testing processes to ensure requirements are met to the Agency's satisfaction. The Agency will be included as part of the demonstration of the application.

5.10.1.1.22 Evaluation of the Impact of New Services upon Agency Networks (Req_ID 3791; C.2.11.9.1.4(6)(a))

Qwest will evaluate the impact of new services on the networks through network modeling/simulation as well as lab or field trial if needed. Documentation from the tests and trials will ensure that future deployments are successful and sustainable.

5.10.1.1.23 Development of Transition Plans (Req_ID 3789; C.2.11.9.1.4(6)(b))

Qwest will develop the service transition plans (Agency-Level Transition Plan and Transition Management Plan as defined in the Networx RFP) based on the Agency's specific requirements and the network impact study completed by Qwest. During this development, Qwest will seek the Agency's continuous feedback. After the transition plan is finalized, Qwest will provide the Agency with the complete transition plan that includes a proposed service topology/architecture, technical solutions, resource requirements, timelines, and deliverables.

5.10.1.1.24 Implementation Support (Req_ID 3834; C.2.11.9.1.4(6)(c))

Qwest provides a dedicated project management/engineering/ operations team to ensure successful implementation. Qwest will provide not only all the technical solutions/resources but also start-to-end technical support to facilitate the transition of services.

[redacted] Various optical and

enterprise test equipment is employed to support the test and verification efforts to ensure service is up and operating as planned.

As shown in ***Figure 5.10.1-3***, the Qwest Team has clearly defined roles and responsibilities at each level within the organization to ensure success throughout the transition process.

Figure 5.10.1-3. Key Transition Personnel Roles and Responsibilities. *Qwest has clear roles and responsibilities to ensure efficient management of each transition activity.*

Roles	Responsibilities
Government Services Leadership Team	
Qwest Program Director	
Transition Program Manager	
Project Managers	

5.10.1.1.25 Development of Test and Acceptance Plans and Criteria (Req_ID 3833; C.2.11.9.1.4(6)(d))

Qwest will develop and provide the complete test and acceptance plans (the Networx Services Verification Test Plan as defined in section E.2.2 of the Networx RFP) and criteria to be used to validate/accept the production network and services. Major parts of the test plan will include the turn-up procedure, validation of hardware and software, service provisioning, and performance parameter measurement.

Qwest's Networx Services Verification Test Plan will detail the standard test procedures that are used by the Agency to verify that the services delivered under the contract meet the KPI/AQL thresholds for the ordered service as specified in Section C.2, Technical Requirements, prior to delivering the ordered service to the Agency. Qwest is further proposing standard commercial acceptance testing procedures and thresholds to verify acceptable performance and KPI/AQL compliance.

The Networx Services Verification Test Plan describes the process and procedures for verification testing of individual services ordered under the contract and the change procedures for adding service-specific test plan attachments. Qwest will notify the GSA Program Management Office of any changes to its Networx Verification Test Plan, such as the addition of service-specific test plans.

5.10.1.1.26 Measurement and Assessment of Network Performance (Req_ID 3832; C.2.11.9.1.4(6)(e))

As part of the transition plans (Agency-Level Transition Plan and Transition Management Plan as defined in the Networx RFP), from a pilot to general deployment, the Qwest Team will document all required methods and procedures, create an issues/resolutions list, and perform a comparison analysis of design versus implementation. The analysis will indicate whether

the design works as simulated and tested, or whether any issues with the pilot will cause a modification to the network design. Depending on the SOW, the analysis could include measurements such as Quality of Service (for example, latency, jitter, Bit Error Rate), network availability, capacity, and deployment costs.

5.10.1.1.27 Installation of Network Hardware and Software (Req_ID 3831; C.2.11.9.1.4(7)(a))

[redacted]

5.10.1.1.28 Configuration of Network Devices (Req_ID 3830; C.2.[redacted]

[redacted]

5.10.1.1.29 Installation of On-Premises Cable and Network Drops (Req_ID 3829; C.2.11.9.1.4(7)(c))

[redacted]

5.10.1.1.30 Testing and Acceptance Procedures (Req_ID 3828; C.2.11.9.1.4(7)(d))

[redacted]

5.10.1.2 Benefits of Customer-Specific Design and Engineering Service Technical Approach (L.34.1.5.1(b))

Figure 5.10.1-4 summarizes the features and benefits of Qwest's CSDES Solution.

Figure 5.10.1-4 Qwest Team CSDES Features. *Qwest delivers CSDES with considerable experience, skills, and processes.*

Features	Benefits	Substantiation
Focused team with single point of contact for each customer	[redacted]	[redacted]
Skilled staff with engineering discipline and bench strength for a wide range of IT and telecommunications services	[redacted]	[redacted]
Domain expertise for many Agencies due to many years of experience	[redacted]	[redacted]

Among the benefits of our technical approach to CSDES is that it uses the repeatable SE processes that will ensure common service access and delivery, service platform and infrastructure, component framework, and service interface and integration.

Qwest's CSDES are consistent with and support the Federal Enterprise Architecture (FEA) goals, as shown in **Figure 5.10.1-5.**

Figure 5.10.1-5 Qwest Services relative to FEA Goals

FEA Goals	The Qwest CSDES
Improve utilization of Government information resources	Use of repeatable processes and disciplines optimizes Government resources.
Enhance cost savings and avoidance	Use of standard and robust Qwest offerings as well as utilization of established test facilities enables the reduction of cost to Agencies.
Increase cross-Agency and inter-Government collaboration	Reuse of work accomplished for one Agency may be employed for another.

5.10.1.3 Solutions to Customer-Specific Design and Engineering Service Problems (L.34.1.5.1(c))

Agency CSDES requirements vary widely and may include a range of unique network, IT, Operations, and Security elements. Qwest's entire Federal business rests on a foundation of successfully completed CSDES programs for Agencies. Qwest's experience in this service environment has led to creation of an efficient, disciplined, and controlled approach to fulfilling Agency needs.

Qwest's CSDES approach identifies potential problems as early as possible in the program lifecycle and resolves them with the Agency before beginning implementation. A continuous cycle of program status checkpoints and validation of deliverables against documented requirements facilitates early discovery and remediation of potential difficulties. As soon as the Qwest Team becomes aware of emerging or unanticipated problems, our SOW manager will document and discuss such issues with the Agency to arrive at a solution. These issues and possible resolutions will be discussed per the documented CSDES project plan. Examples of potential problems that may be encountered while fulfilling CSDES requirements are found in the following table, [redacted] along with Qwest's methods for resolving them.

Figure 5.10.1-6. Potential problems and solutions while delivering CSDES

Problem	Solution
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Problem	Solution
[redacted]	[redacted]

5.10.2 Satisfaction of Customer-Specific Design and Engineering Service Performance Requirements (L.34.1.5.2)

Qwest will provide performance metrics by which the Agency will be able to assess the fulfillment of CSDES project requirements.

5.10.2.1 Customer-Specific Design and Engineering Service Quality of Service (L.34.1.5.2(a))

There are no pre-established CSDES performance metrics. Metrics will be established for and indigenous to a specific SOW. As appropriate and agreed to in a specific Agency SOW, performance metrics pertaining to a CSDES solution may include assurances of technical and functional compliance, along with a well-defined progress and implementation schedule to ensure that a customer's needs and SOW performance expectations will be met. Such metrics will depend upon the service being provided and SOW scope and complexity. Metrics associated with an SOW solution may include such operational or performance factors as Network Availability, Mean Time to Repair, Response Time, Cost Efficiency, Requirement Modifications, Action Item Resolution, Mean Time Between Failures, Throughput, Billing Accuracy, Quality of Service (latency, packet loss, jitter), and Missed Due Dates.

Each specific performance metric or KPI will define an AQL and a plus and minus range. Throughout a CSDES SOW effort, Qwest corporate standards and processes required by various certifications, such as CMMI, will be followed to ensure optimal quality performance.

5.10.2.2 Approach for Monitoring and Measuring Customer-Specific Design and Engineering Service (L.34.1.5.2(b))

Because CSDES performance metrics and deliverables will be TO-specific, no standardized KPIs or AQLs can be referenced to compare and assess SOW performance. However, Qwest will, in cooperation with each Agency CSDES customer, mutually agree to and define SOW performance metrics for each CSDES activity relevant to deliverables and as defined in the SOW.

There are a number of project management and network monitoring tools that will be used to collect and compute KPIs and AQLs for CSDES. Monitoring and reporting can be accomplished on various levels of resolution as requested by the customer, such as site-by-site, network-wide, by cost center, or regionally.

5.10.2.2.1 Measurement and Assessment of Network Performance and Availability (Req_ID 3808; C.2.11.9.1.4 (2) (c))

As part of the analysis with the Agency, Qwest will identify metrics and methods to measure these metrics. The performance will be measured before deployment and after deployment. The network design will be modified as needed to gain optimal performance and ensure all metrics are met.

5.10.2.3 Verification of Customer-Specific Design and Engineering Service (L.34.1.5.2 (c))

Qwest requires that every CSDES SOW will be independently reviewed by each functional group within the Qwest CPO for technical merit, management efficiency, and compliance. This review ensures that the project meets or exceeds the technical, cost, and schedule requirements defined in the SOW. It will be carried out by qualified people independent of the project, and it is the responsibility of the Project Engineer to schedule and staff the reviews. We will tailor the review process and coverage consistent with the

CSDES SOW goals to ensure optimum performance. Factors bearing on this review include the relative importance and size of the project; the experience of the project staff; the technical, schedule, and cost risk; and other concerns regarding best possible SOW performance. Such reviews may range from a minimum of two checkpoints (requirements review and design validation, and review of project final report) to the creation of a standing program review board with scheduled meetings and formal reporting.

The Qwest Team's Quality System Manual consists of a statement of policies, organization, and responsibilities, and volumes of specific guidance in the areas of quality assurance for software, hardware, environmental and energy services, and International Organization for Standardization (ISO) 9000. [redacted] depicts our overall Quality Assurance (QA) approach and relationships to CMMI and ISO 9000 standards.

5.10.2.4 Customer-Specific Design and Engineering Service Performance Level Improvements (L.34.1.5.2 (d))

The AQLs and KPIs will be established by agreement between the Qwest Networx Team and the Agency customer and will further include performance improvement metrics.

5.10.2.5 Additional Customer Specific Design and Engineering Performance Metrics (L.34.1.4.2 (e))

The Qwest Team will propose additional performance metrics based on the SOW deliverables and our common approach to SE, project controls, and project management. For every project SOW, process requirements and expectations for the project are documented, metrics are defined, and baselines are established for project management and control in a project-specific QA Plan. The project-specific QA Plan is customizable to the SOW requirements and is readily adaptable to:

[redacted]

The QA Plan is an important tool to ensure project success through the early definition and agreement to all project parameters, such as developing project estimates, developing and maintaining project cost and schedule, and measuring project performance and progress against the SOW requirements.

The QA Plan tailors our defined processes and policies to the specific requirements of the SOW and creates a project-specific framework for measuring our approach to:

[redacted]

Because there are no pre-established CSDES performance metrics, the Qwest Team will coordinate with the Agency to establish a specific QA Plan for every CSDES SOW. The Qwest Team and the Agency customer will agree on specific AQLs and KPIs that will be used to measure overall project performance and create a clear definition of project success.

5.10.3 Satisfaction of Customer-Specific Design and Engineering Specifications (L.34.1.5.3)

Qwest will provide highly credible and cost-effective CSDES solutions to Agencies.

5.10.3.1 Satisfaction of Customer-Specific Design and Engineering Requirements (L.34.1.5.3(a))

Qwest will notify any Agency of CSDES SOW service requirements or deliverables that are beyond the scope of our technical, engineering, or project management capabilities or that require essential systems assets (or other resources) that the team cannot readily apply and use for achieving satisfactory and compliant SOW performance. Under all other conditions surrounding delivery of a CSDES SOW, the Qwest Team's industry certified SE processes, procedures, standards, and general approach to satisfying SOW requirements will be uniformly applied to SOW goals in a manner fully

responsive to satisfying specified requirements, including technical, management, delivery, and schedule. Qwest fully complies with all mandatory stipulated and narrative features, capabilities, and interface requirements for CSDES. The text in this section (5.10) is intended to provide the technical description required per L.34.1.5.1(b), and does not limit or caveat Qwest's compliance in any way.

5.10.3.2 Proposed Enhancements for Customer-Specific Design and Engineering (L.34.1.5.3(c))

[redacted]

5.10.3.3 Network Modifications Required for Customer-Specific Design and Engineering Delivery (L.34.1.5.3(c))

Each CSDES SOW is custom, and network impacts will be assessed on a case-by-case basis. Qwest recognizes the potential for network impacts associated with custom design efforts and will make necessary modifications to support CSDES. Historically, Qwest has succeeded in identifying and managing potential impacts and risks through application of our rigorous requirements and testing methodology.

5.10.3.4 Experience with Customer-Specific Design and Engineering Delivery (L.34.1.4.3 (d))

Delivering CSDES is one of the core competencies the Qwest Team offers Agencies. A prime example of CSDES services currently being provided is the work currently being [redacted] that provides a range of CSDES relevant telecommunications support services. These include: