

## APPENDIX O—TELECOMMUNICATIONS REFERENCE MANUAL

### INTRODUCTION

Appropriate telecommunications planning, management and control is critical to the success of IT projects. This document provides guidance on the planning, management and control of telecommunications equipment and services as required by the USDA Capital Planning and Investment Control (CPIC).

Although the emphasis of this document is on high-dollar, high-risk, and highly visible projects, recommendations presented throughout this document can be applied to *all* acquisitions of telecommunications equipment and services.

It is the goal of the Department to continuously improve telecommunications materials to support customers. This Telecommunications Reference Manual is a living document and will be periodically updated in coordination with major calls for (Capital Planning and Investment Control) CPIC updates. Updates will include improved methods, approaches, and processes, and include material on the most current products and services.

### What Is Included

This Manual includes:

- (1) Frequently Asked Questions
- (2) How to prepare documentation for each phase of the USDA CPIC cycle.
- (3) USDA Guide for Creating a Telecommunications Plan
- (4) Telecommunications Cost Estimating Checklists (Attached towards the end of the Manual)

### FREQUENTLY ASKED QUESTIONS

Question 1: What is the level of detail needed for planning and reporting telecommunications?

Answer: The level of detail should commensurate with the size and impact of project. For example, telecommunications technology assessment may not be needed for projects with costs of \$250,000 or less. However, all proposals should provide sufficient supporting details. The details should include information on telecommunications requirements (number of users, locations, usage, etc.), telecommunications performance goals/measures, and calculation of related costs.

Question 2: What is the purpose of planning and reporting telecommunications separately from the overall project? It is difficult to break out telecommunications costs by application.

Answer: The USDA CPIC process has identified telecommunications as a separate investment evaluation factor. Separate planning and reporting of telecommunications is needed to accurately evaluate and report a project's progress. Delineation of telecommunications cost for a specific application may be difficult but pro-rated costs can be projected based on system usage. Often, the information required for the review is the same information that agencies provide to their network planners and implementers prior to implementing an application.

Question 3: The new OMB 300s do not have a specific section on telecommunications. How should telecommunications be reported in the 300s?

Answer: Telecommunications related information and costs could be reported to OCIO during the review process either as a supplement and/or in the Enterprise Architecture section of the 300s.

## Contact Information

This manual is facilitated and maintained by the USDA Office of the Chief Information Officer's (OCIO) Associate CIO for Telecommunications Services and Operations, Telecommunications Management Division. Questions or comments may be directed to Rajiv Sharma at (202) 720-8109.

## PRE-SELECT PHASE ACTIVITIES

The Pre-Select phase activities include a Gap Analysis and a Rough Order of Magnitude Lifecycle Cost Estimate. Below are details of the activities.

**Gap Analysis:** The focus here is on understanding user requirements, defining preliminary network objectives, and estimating the scope and size of changes and upgrades to the current network to meet the operational requirements of the system being implemented. The project team studies the customer problem and the context in which the problem occurs. A preliminary investigation should indicate whether any problems are related to existing performance, a need for different information or data, a need for improved cost control, security requirements, efficiency requirements, or customer service issues. Once the current environment and customer concerns are understood, it becomes possible to define the perceived business problems, as well as the causes and effects. Preliminary network improvement objectives are defined, and an analysis determines the size of the gap between the legacy network and requirements for change. Team members can identify what technology exists in the legacy network that performs functions associated with improvement objectives, and assess the current state of network performance relative to those objectives. In the early stages, it should be possible to determine whether the problems are too minor or great to solve, or whether next steps should be taken to initiate a project. The gap analysis should have sufficient detail to determine the scope of a project.

Scope defines how big the project is and how long it may take to accomplish the improvement objectives. USDA telecommunications technology experts such as network design engineers, network operations technicians or network transmission engineers should be able to review the current state of the network and estimate in general terms how much development is required to achieve the desired state, and how long it might take.

**Rough Order of Magnitude System Development Lifecycle Costs:** Gap analysis findings should define the general scope of the project including the current state of technology, the desired state of technology, and the delta between the two. Cost estimates for closing the gap between the current and desired state of network functionality helps evaluators determine the feasibility of moving forward. Costs may indicate that the problems are not worth solving, or that the team should continue to the next phase according to a reduced or expanded scope.

Depending on how much information exists about the current and desired state of the network, analysis during the Pre-Select Phase may involve varying levels of effort. The goal is to gather as much meaningful data as possible without moving into actual design analyses.

A telecommunications cost estimating checklist is included towards the end of this Telecommunications Reference Manual for calculating costs.

Minimally, the Pre-Select submission should answer the following:

- Φ What is the scope of anticipated telecommunications requirements for the project? What changes to the current telecommunications capability do you anticipate in order to meet operational requirements?
- Φ What obstacles might prevent the organization from meeting existing or anticipated business or technical requirements for telecommunications support?

- Φ What is the current project budget for telecommunications? Anticipated budget for telecommunications?
- Φ Based on a preliminary assessment of costs for anticipated telecommunications requirements, are ROM lifecycle costs feasible when considering the return on investment? Refer to the telecommunications cost estimating checklist provided towards the end of this manual.

## SELECT PHASE ACTIVITIES

The first step in the Select Phase requires a Telecommunications Infrastructure Analysis leading to an Agency Telecommunications Plan. The following tasks describe specific activities that a project team may want to consider during the Select Phase that can help satisfy requirements for both an Infrastructure Analysis and a project Telecommunications Plan.

**IMPORTANT:** Please note that NOT all select phase activities need to be performed for all projects. Some of the select phase activities listed below can be skipped if the size and cost of telecommunications is insignificant. However, please state the reason for not performing an activity.

### User Requirements Definition

Fully define the business requirements (needs) of the customer and describe how does the customer see the system/application working. Provide the projected number of users that will be accessing the system/application (internal, external, trusted partners, clients, public), number of concurrent users, peak usage including originating/destination traffic, peak time periods of user activity, telecommunications performance requirements (availability, etc), and telecommunications security requirements. Also indicate when does the customer need the telecommunications facilities/equipment to be operational. The development of annual projections by the customer for routine telecommunications and the wireless program is also an integral component. Consider any large purchases of cellular phones, pagers, or other personal communications systems by your customer.

### Refined Gap Analysis/Impact Assessment

This is refining the gap analysis developed in the Pre-Select phase. In the Select phase, user requirements are refined, and as a result, the gap analysis should be refined to reflect the new requirements. Refer to the telecommunications cost estimating checklist provided towards the end of this manual.

### Technology Assessment

Conduct and provide an analysis of best available technologies (ISDN, Frame Relay, Asynchronous Transfer Mode, Gigabit Ethernet) to meet the requirements based on cost, performance and government regulations. It is an assessment of the suitability of a technology for a given application. The activity does not need to be performed for small investments.

### Cost-Benefit Analysis

This is a quantification and evaluation of cost, benefits and risks of various telecommunications alternatives considered for a project. This could include analysis of purchasing new equipment versus upgrading existing equipment. This activity may be skipped where the use of a certain contract may be mandatory. For example, the FTS2001 contract. However, life cycle costs should be calculated.

Conduct a cost-benefit analysis, identify and quantify benefits and costs, and prepare estimates for the telecommunications infrastructure supporting the system/initiative/project. Benefits should describe how the investment enhances the agency's ability to meet its mission needs, and should outline functionality or cost savings. Benefits are defined as a profit, advantage, or gain attained by using the investment.



Cost refers to both the initial investment and capitalized costs, and can be categorized as direct or indirect. Costs that are unidentified in the Select Phase frequently account for a large number of IT project cost overruns.

Provide a list of system components to be ordered, the price, and time for delivery/installation. Incorporate a plan to mitigate and manage identified risks in the business case justification. Additional information on the factors considered in a Cost-Benefit Analysis can be obtained from the Federal CIO Council web site ([www.cio.gov](http://www.cio.gov)) in the publication "ROI and the Value Puzzle." The program managers or representatives who are familiar with technology solutions and their benefits to organizations should develop the analysis.

Refer to the telecommunications cost estimating checklist provided towards the end of this manual.

### Cost/Performance Trade-off

Sometimes, giving up small system performance may result in big cost savings. Agencies are encouraged to performance a cost/performance trade off analysis to see if what small performance sacrifices may result in a big cost savings. The sacrifices must be acceptable. For example, lowering performance threshold for circuit availability may result in a big savings. However, the lower threshold must be acceptable to the customer.

### Guide for Creating a Telecommunications Plan

A telecommunications plan for a project should be prepared that reflects the design considerations and implementation requirements used in planning this project. This plan should include a detailed technical overview of the telecommunications services and equipment to be deployed for this project. In addition, the project's link to the objectives in the agency strategic or business plan should be included. In short, the plan is a narrative and presentation of all the activities performed. [Click here](#) for additional information and step-by-step instructions for developing a telecommunications plan. Please note that some of the information may not be required for smaller investments. Guidance regarding smaller investments can also be found in the [Guide for Creating a Telecommunications Plan](#).

### *Department Enterprise Architecture*

Describe how the telecommunications infrastructure design conforms to the Department's Enterprise Architecture Principles for interoperability, resources sharing, and use of COTS software/products. Information concerning the Enterprise Architecture (EA) can be obtained by accessing [www.ocio.usda.gov/irm/e\\_arch/index.html](http://www.ocio.usda.gov/irm/e_arch/index.html), select the OCIO Staff Office, select IRM and Enterprise Architecture. General information on the considerations of EA can be found at the web site for the Federal CIO Council located at [www.cio.gov/files/aaaq.pdf](http://www.cio.gov/files/aaaq.pdf).

### Special Requirements of the Project (Waiver, Technology Search)

Does the telecommunications infrastructure required to support the investment require a waiver from the government-wide acquisition vehicles (FTS2001, WITS2001, Metropolitan Area Acquisitions) prescribed in Departmental Regulation 3300-1? If so, contact the Associate CIO for Telecommunications Services and Operations for guidance on how to proceed.

Is a telecommunications acquisition moratorium waiver needed? The Office of the Chief Information Officer (OCIO) requires waiver approval for all telecommunications purchases regardless of the dollar amount. Although a waiver request is normally separate from an IT investment package, approved investments still require waivers for acquisitions. Planned data telecommunications acquisitions should be entered into the Department's Forecasting Inventory and Reporting (FIR) database. The FIR database is open twice a year for new entries and updates.



A waiver should be requested early in the pre-acquisition process, preferably concurrent with the investment package, to allow sufficient review by the necessary offices within OCIO. The waiver package should clearly identify reason(s) for the request, include comprehensive cost comparisons, and contain a strong justification for waiver approval. It should be sent to the USDA Chief Information Officer. IT acquisition should only commence after written approval has been obtained from OCIO.

### **Support from the OCIO, Telecommunications Services and Operations (Wide Area Network Support, Internet Access, Traffic Analysis)**

The OCIO, Telecommunications Services and Operations (TSO), provides agency support on both a continuing and project basis for Internet access, data transmission and metropolitan area network (MAN) requirements using the USDA enterprise network. TSO performs network/application modeling, and also maintains, operates, and initiates orders for expansion of the enterprise network. Will the system/initiative/project require integration with the USDA enterprise network? If so, coordination with TSO can help project teams fully define telecommunications infrastructure requirements, anticipated data traffic, Internet or remote access, and interpretation of legislative implementation mandates.

### **Security Required, Identification of Data Sensitivity, Security Analysis**

A Security Analysis is always required for any new IT initiative or project. This analysis should be conducted in conjunction with your agency Information Systems Security Program Manager (ISSPM). The results should be documented in a Security Analysis for the investment. A review of security should also be done for the ongoing telecommunications and wireless programs annually to ensure that any mission critical or sensitive data transmitted over wireless, satellite, or telecommunications facilities have the appropriate levels of encryption.

The Telecommunications Infrastructure is the full range of voice, data, and video services and equipment, including Internet, intranet, extranet, LAN, WAN, and wireless, toll-free network services, and calling card services. The telecommunications infrastructure has two components: (1) telecommunications equipment and (2) telecommunications service. Telecommunications equipment includes routers, switches, private branch exchanges (PBXs), cell phones, video cameras, etc., used for various modes of transmission, such as digital data, audio signals, image, and video signals. Telecommunications carriers provide telecommunications services to move data, voice, or video signals from one location to another, regardless of the type of media used.

A telecommunications plan for this system/initiative should be prepared that reflects the design considerations and implementation requirements used in planning this project. This plan should include a detailed technical overview of the telecommunications services and equipment to be deployed for this project. In addition, the project's link to the objective (s) in the agency strategic or business plan should be included.

### **CONTROL PHASE ACTIVITIES**

The focus in the Control Phase is on the management and control of telecommunications cost and performance. The telecommunications cost baseline and performance goals established in the Select Phase are measured and monitored in this phase. The following should be submitted in the Control Phase:

- Φ • Planned and actual telecommunications costs. This information should be easily available from the project and/or telecommunications plan. For additional information, see the [Guide for Creating a Telecommunications Plan](#). For projects with telecommunications cost variance of 10% or more, the submission should include an explanation for the variance, corrective action, and revised cost estimates.

- Telecommunications performance objectives and a report of status. This is relevant if 50% or more of the investment is comprised of telecommunications products and services. For additional information, see the [Guide for Creating a Telecommunications Plan](#). Projects that are not meeting the stated objectives should include an explanation and action plan for ensuring that performance objectives are met.

**IMPORTANT:** TSO recognizes that telecommunications cost baseline was never developed and established for some projects that were undertaken prior to the USDA CPIC process. It is recommended that pro-rated costs be developed and submitted for such projects.

## EVALUATE PHASE ACTIVITIES

The Evaluate Phase activities include Post Implementation Reviews (PIR) to compare actual results to planned outcome and lessons learned.

- The PIRs include an assessment of telecommunications costs, benefits, performance, documentation, and customer satisfaction. Work results should be documented to serve as historical information for new projects.
- Lessons learned should document information such as cost and performance variances, explanations for variances, corrective actions and reasoning behind the corrective actions chosen. Lessons learned should also serve as historical information for new projects.

## STEADY STATE PHASE ACTIVITIES

The activities conducted in the Steady State Phase are similar to the Evaluate Phase activities. The focus of the Steady State Phase activities is on the continued effectiveness of the telecommunications infrastructure. The business case submissions in this phase should provide information on the cost of continued maintenance and operations, assessment of new technologies and opportunities, and replacement of the current telecommunications technology. In some cases, the replacement may be required due to expiration of the current contract. Depending on the dollar amount and project requirements, a telecommunications plan may be required. For detailed instructions to create a telecommunications plan, please [click here](#).

## GLOSSARY OF TELECOMMUNICATIONS TERMS

**Best Practices**—Processes, practices, or systems used by public and private organizations that perform exceptionally well and are widely recognized as improving an organization's performance and efficiency in specific areas. Successfully identifying and applying best practices can reduce business expenses and improve an organization's efficiency.

**Bridge**—A network interconnectivity device that selectively determines the appropriate segment to which it should pass a signal. Through address filtering, bridges can divide busy networks into segments and reduce network traffic. (Or) Services provided by a carrier to connect three or more audio or video conferencing systems so they can all communicate.

**Cost Benefit Analysis**—A technique used to compare the various costs associated with an investment or project with the benefits it proposes to return. It should address both tangible and intangible benefits and use net present value figures.

**Effectiveness**—An assessment of the qualitative level of achievement of program goals and the intended results, as defined in strategic or other plans or documentation or in legislation.

**Metropolitan Area Network**—A data network covering an area larger than a local area network (LAN), but less than a wide area network (WAN). A metropolitan area network (MAN) typically interconnects two or more LANs. MANs may operate at a higher speed than LANs, may cross-administrative boundaries, and may use multiple access methods.

**Performance Measures/Performance Measurement**—The process of developing measurable indicators that can be systematically tracked to assess progress made in achieving predetermined performance goals and to benchmark an organization's performance against that of other organizations.

**Post-Implementation Review**—An review of an investment or project that compares the actual cost, schedule, performance, and other results achieved after an investment or project has been completed and is fully operational against the conditions that existed prior to the implementation of the investment or project, as indicated by baseline cost, schedule, and performance data, and against the planned cost, schedule, and performance goals established for the investment or project. A post implementation review can provide valuable "lessons learned" that can be applied to future investments or projects.

**Private Branch Exchange (PBX)**—a private telephone switching system usually located on a customer's premises with an attendant console. It may use traditional analog, ISDN, or data telecommunications protocols.

**Router**—An intelligent Internet work connectivity device that uses logical and physical addressing to connect two or more logically separate networks. Routers use algorithms to determine the best path by which to send a packet.

**Security Analysis**—A formal analysis conducted by the agency Information Systems Security Program Manager (ISSPM) or designee for the purpose of determining the importance of the information, assessing risks, formulating mitigation strategies, and other measures needed to safeguard the system/application.

**Software**—The detailed instructions to operate a computer or other type of equipment or hardware. The term was created to differentiate instructions (i.e., the program) from the hardware.

**Telecommunications**—For purposes of this questionnaire, telecommunications is the full range of voice, data, and video services and equipment, whether stand alone or connected, including Internet, intranet, and extranet services and equipment as well as wireless services and equipment (e.g., cellular and pager), toll-free network services, and calling card services. Also included are services that use multiple technologies, such as net conferencing with audio conferencing to facilitate group communications.

**Telecommunications Equipment**—Devices such as routers, switches, private branch exchanges (PBXs), cellular telephones, and video devices used in the transmission of voice or data.

**Telecommunications Service**—Any service provided by a telecommunications carrier. A specific set of user-information transfer capabilities provided to a group of users by a telecommunications system. The telecommunications service user is responsible for the information content of the message.

**Video**—An electrical signal containing timing (synchronization), luminance (intensity), and often chrominance (color) information that, when displayed on an appropriate device, gives a visual image. Video is very bandwidth intensive and requires specialized transmission equipment to transport true images from one type of media (e.g., television) to another (e.g., computers). Non-compatible video systems can be linked via bridge services offered by carriers.



**Wide Area Network (WAN)**—A network typically extending a local area network (LAN) or metropolitan area network (MAN) over telephone common carrier lines to link to other LANs or MANS. A WAN typically uses common-carrier leased lines, for example, from an analog phone line to a T-1 line. The jump between a LAN or MAN and a WAN can be made through a device called a bridge or a router.

**Wireless**—Wireless communication is anything that support communications between mobile, portable or fixed facilities through use of the electromagnetic spectrum. Examples are: AM and FM broadcasting, UHF and VHF television, satellite, microwave, land mobile radio, citizen's band, paging, cellular telephone, wireless LANs, wireless telephone PBXs and Personal Communications Services (PCS).



## TELECOMMUNICATIONS COST ESTIMATING CHECK LISTS

The following section introduces checklists of telecommunications cost elements that project team members may want to include in budget plans.

**The Cost Checklist for Telecommunications Labor** includes recommended tasks that have telecommunications labor costs and are tied to evaluation criteria. It is important to consider what labor costs are likely to occur throughout the entire system development lifecycle and develop high-level estimates based on the general scope of the anticipated tasks. During the Pre-Select Phase, it is not necessary to go into a great level of detail calculating full-time-equivalent (FTE) hours, however.

Staffing costs make up a significant percentage of overall project costs because they are often recurring for key personnel throughout the life of the project. Conceptual checklists of personnel who may charge against a project include general administrative support staff responsible for tracking documentation, technical specialists knowledgeable about specific disciplines of telecommunications engineering, and managers at various levels of oversight. This list does not constitute an entire index of required personnel. It is intended to help CPIC authors think about multiple levels of staffing during various phases of a project. Personnel may include USDA internal staff, contractors, consultants, service providers, or a combination of each.

Beginning in the Pre-Select Phase, project costs should be captured in Universal Budget Object Class Codes that have been established by OMB for this purpose. Organizing costs according to this classification early in a project allows Project Managers to use a common frame of reference that is consistent throughout the entire project when discussing budgetary issues with team members and the E-Board. An agency's Chief Financial Officer, Comptroller, or Procurement Specialist should be able to help project managers organize costs according to the correct Budget Object Class Codes.

### Cost Checklist for Telecommunications Labor

<b>Cost Checklist for Telecommunications Labor Based on Fiscal Year 2002 Approved Evaluation Criteria</b>		
<b>Tasks</b>	<b>Components</b>	<b>Personnel</b>
Agency Telecommunications Plan	Planning	Agency head, agency sponsor, project sponsor or functional manager, IT manager, system analyst, capital planning analyst, budget analyst, quality assurance manager, configuration management specialist, administrative
	Design	Project manager, IT manager, system analyst, network architecture engineer manager, traffic modeling engineer, systems integration engineer, test engineer, quality assurance manager, configuration management specialist
	Acquisition	Contracting specialist, project manager, IT manager, capital planning analyst,
	Installation	Project manager, on-site technicians, integration engineer, test engineer, administrative, logistics (inventory tracking, handling shipping), training, administrative
	Operations and Maintenance	Functional manager, training manager, help desk logistics (maintenance, repairs), technical engineering, support, administrative, quality assurance manager, configuration management specialist

Cost Checklist for Telecommunications Labor Based on Fiscal Year 2002 Approved Evaluation Criteria		
Assessments, Evaluations, Estimates	Gap Analysis	Project sponsor or functional manager, project manager, IT manager, system analyst, network architecture engineer
	Rough order of magnitude lifecycle cost	Project sponsor or functional manager, project manager, IT manager, system analyst, network architecture engineer
	Telecommunications infrastructure analysis	Project manager, IT manager, system analyst, network architecture engineer, traffic modeling engineer, systems integration engineer, test engineer
	Cost Estimate	Project manager, IT manager, system analyst, network architecture engineer, traffic modeling engineer, systems integration engineer, test engineer
	Systems/service performance goals/measures	Project manager, IT manager, system analyst, network architecture engineer, traffic modeling engineer, systems integration engineer, test engineer, quality assurance manager, configuration management specialist
Reviews	Cost Estimate	Agency head, agency sponsor, project sponsor or functional manager, project manager, IT manager, system analyst, capital planning analyst, budget analyst, administrative
	Telecommunications infrastructure post-implementation	Project sponsor or functional manager, project manager, IT manager, system analyst, network architecture engineer, quality assurance manager, configuration management specialist
	Performance Goals/Measures	Project sponsor or functional manager, project manager, IT manager, system analyst, network architecture engineer, quality assurance manager, configuration management specialist
	Project Status	Project sponsor or functional manager, project manager, IT manager, system analyst, network architecture engineer

**The Cost Checklist for Telecommunications Labor** provides a checklist of additional telecommunications components that may be useful in developing a rough order of magnitude lifecycle cost estimate for the Pre-Select Phase. Only high-dollar elements, significant volumes of lower cost elements, or recurring lease costs over a significant period of time should be considered during the Pre-Select Phase. This may not be an all-inclusive list of telecommunications costs; however, it is intended to provide CPIC authors with a quick reference list of frequently purchased equipment and services, and to remind project managers of frequently overlooked costs such as facilities and real estate.

### Facilities

- Office space for project management office telecommunications team members
- Logistics including equipment staging, warehousing (spares), training, repairs
- Cost of new construction for implementation
- Cost of modifications for implementation
- Land mobile radio shelters.

### Real Estate

Property for telecommunications facilities or infrastructure.

## Network Design, Development, and Management Software Tools

- Requirements management
- Diagramming
- Design
- Traffic modeling
- Simulation
- Prototyping
- Optimization
- Network management
- Configuration management
- Quality assurance
- Help desk
- Inventory tracking.

## Cost Checklist for Telecommunications Elements

### *Application Software*

- Purchased COTS applications
- Periodic COTS license fees.

### *Hardware/Equipment (purchase and lease costs)*

End user:

- Plain old telephone service (POTS) Handsets
- Secure phones
- Secure faxes
- Secure cellular telephones
- Fixed telephony
- Pay telephones
- Pagers
- Cellular telephones
- PCS telephones
- Satellite telephones
- Enhanced specialized mobile radios (Nextel)
- Land mobile radios
- Videoconferencing equipment
- Satellite dishes.

*Hardware/Equipment (purchase & lease costs)*

Network Infrastructure

- Web Servers
- Communications hardware (hubs, routers, bridges, switches, PBXs)
- Power protection devices (UPS, line conditioning equipment)
- Backup generators
- Network cabling
- Network interface cards
- Lab or test equipment (percentage of use dedicated to specific project)
- Operations support servers (e.g., billing, inventory tracking, maintenance)
- Microwave equipment
- Radio towers
- Repeaters
- Wiring.

*Services*

- Local voice, video and data transmission services (includes frame relay, voice over the Internet protocol (VoIP), digital subscriber line (DSL), integrated services digital network (ISDN), asynchronous transfer mode (ATM), etc.)
- Domestic long distance voice, video, and data transmission services
- International voice, video, and data transmission services
- Secure voice, video, and data transmission services
- Toll free number services
- Commercial wireless transmission services
- Microwave frequency management
- Land-mobile radio frequency management
- Automated attendant
- Voice mail
- Teleconferencing
- Videoconferencing
- Internet access
- Access for the disadvantaged
- Call center support
- Help desk support
- Redundancy
- Emergency response
- Recovery
- Repairs
- Capacity planning



- Cost estimating
- Cost management
- Records management (call detail records)
- Design
- Integration
- Installation
- Testing
- Optimization
- Training.