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Engineering & Consulting P.S.

CCIT NST
TELECOMMUNICATIONS
INFRASTRUCTURE PROCEDURES

PREPARED FOR:

CLEMSON®
NETWORK SERVICES AND
TELECOMMUNICATIONS

CCIT Network Services & Telecommunications

TELECOMMUNICATIONS INFRASTRUCTURE

PROCEDURES

August 31, 2018

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PREPARED FOR:

Clemson University
Clemson Computing and Information Technology

Table of Contents

1 Preface

1.1 Introduction

A.   The Telecommunications Infrastructure Procedures (TIP) document is written to communicate with members of the Clemson University (Clemson) community about how to obtain telecommunications services at Clemson facilties, including telephone, network, WiFi, and other services.

B.   This document was prepared by the CCIT Network Services and Telecommunications (NST) department at Clemson University and by Summit Engineering & Consulting, P.S. As technology and needs evolve, the document will be periodically updated.

- •   August 2018 – Originally published

C.   The TIP is written as a companion to the Telecommunications Distribution Design Guide (TDDG), which is focused on communicating with architects, engineers, and contractors who design and construct technology infrastructure at Clemson. The TDDG is available for download from CCIT NST's website.

1.2 Document Intent

A.   The purpose of the TIP document is to improve communication with people and organizations served by CCIT NST and improve the results of this service. Please become familiar with the content that is applicable to your organization, and thereby improve NST's ability to meet your needs.

1.3 Standards and Guidelines

A.   CCIT NST has adopted industry standards and codes as the basis for telecommunications distribution design in Clemson facilities. Clemson leverages these standards to deliver substantial value and performance benefits.

B.   The requirements contained in the TDDG are considered to be in addition to those required under contract with the State of South Carolina. Where the requirements differ, the issue shall be brought to the attention of the Clemson Facilities Project Manager - otherwise the more stringent requirement shall apply.

1.4 Copyright

Summit Engineering & Consulting retains the copyright for this document. Clemson University is authorized to edit and adapt the document.

Summit Engineering & Consulting has authored similar documents for many other organizations. The document is intended (in part) to describe best practices that are found in some segments of the industry. As a result, portions of this document are similar to comparable content in documents previously prepared by Summit Engineering & Consulting for other organizations. This document does not contain any information that is proprietary or confidential to other organizations.

2 Clemson Telecommunications Procedures

This section describes internal Clemson telecommunications policies, requirements, standard practices, and processes associated with designing, installing, maintaining, and operating technology infrastructure. It is intended for an internal audience of Clemson personnel, including:

- Facilities, both Capital Projects and Construction & Renovation
- Student Affairs
- Athletics
- Fire & Safety Services
- Academics
- Research
- Graduate
- Anyone that may be involved in the design, installation, maintenance, or use of telecommunications infrastructure, network equipment, or telephone equipment at a Clemson facility.

2.1   Customers of NST Services

The following policies apply to anyone that may be involved in the design, installation, maintenance, or use of Clemson University's telecommunications, data, and/or networking infrastructure.

2.1.1 SUBMITTING REQUESTS FOR ASSISTANCE

NST is committed to addressing service requests from Clemson University customers in a timely and professional manner. To ensure an efficient response, it helps when Clemson University customers can follow an established process.

2.1.1.1   PRODUCTION-RELATED REQUESTS

Production-related requests include, but are not limited to, issues associated with: network connections, network performance, firewalls, access permissions, voice connections, or voicemail access. Clemson University customers can access production-related support through the following methods:

- Visit the IT Support Center at https://ccit.clemson.edu/support/ and initiating an online chat (accessed under the "Get Help" menu)
- Send an email to ITHelp@clemson.edu
- Call the IT Support Center at (864) 656-3494

2.1.1.2   PROJECT-RELATED REQUESTS

Clemson's Computing and Information Technology (CCIT) has a Project Management Office (PMO) that manages projects and consultation requests involving CCIT. These projects can include, but are not limited to office moves, construction and renovations projects, or capital projects involving telecommunications, data, or networking services. In addition to projects, CCIT offers consultation support.

Customers can visit the CCIT PMO website at https://ccit.clemson.edu/about/departments/internal-operations/project-management-office/ for information on how to complete and submit a Project Proposal Form. Once submitted, the PMO will receive and process the request, and will work closely with NST and other CCIT departments to provide either project or consultation support.

2.1.2   DO NOT ALTER NETWORKING CABLING & EQUIPMENT

Cabling supporting technology shall not be altered by anyone outside NST. Doing so will cause interoperability problems with equipment and may void manufacturer warranties.

Please do not:

- Remove installed connectors
- Attempt to access locked panels
- Remove patch cables

Anyone needing help with cabling should contact NST for assistance.

2.1.3   ASSISTANCE WITH NEW PROJECTS

Please prepare the following form prior to contacting NST to discuss any new projects, new technologies needed, or other requests:

Clemson Computing and Information Technology NST/AV Project Proposal Form			
Project Sponsor or Project Requester, Please Complete Sections A and B and Email to **PMO-L@lists.clemson.edu** (refer to Section C for explanation of terms)			
Type of Project (Hold down 'Shift" key to select more than one item)	Select All That Apply Audio-Visual Networking Telecommunications Request for Consultation Only		
Project Title			
Project Sponsor (Name, department, phone number, and email address)		**Facilities Project Manager (if different from Project Sponsor)**	
Building Name or Location		**Room Number**	
Scope of Work (please attach applicable project drawings if available)			
Project Start Date (required)		**Project Completion Date (required)**	
Anticipated Move-in Date (if applicable)		**Account or Project Number (required)**	
Estimated Total Project Cost	Select One Less than $100,000 $100,000 to $1,000,000 Greater than $1,000,000		
Section B - Supplemental Information - Please Include Additional Information Not Previously Captured			
Section C - Explanation of Terms			
Term	**Explanation**		
Project Sponsor	The person who provides support for the project and is accountable for ensuring the success of the project. The sponsor is responsible for meeting regularly with the project manager, reviewing and approving the project charter, securing financial resources, and ensuring resources from cross-functional teams are provided.		
Project Scope	The scope provides a detailed description of the project to include an explanation of the underlying need for the project and a description of the business objective(s) the sponsor will gain by completing the project.		

2.2   Event Coordinators

Technology needs can vary greatly due to the diverse nature of events. Examples can include ESPN GameDay, athletics, student events, trade shows, banquets, conferences, entertainment, etc.

The Clemson wireless network is not designed to support these events without advance coordination with NST. The following technology-related requirements shall be addressed as conditions of the contract for all Event customers:

- All network services shall be negotiated with NST at the time of booking.
- Customer network services shall be wired connections.
- Customers shall not expect the campus wireless network to meet their needs.
- Secure transaction processing shall not be attempted via wireless networking. There shall be no expectation of privacy via wireless networks.
- It is desirable to be notified 7 business days in advance of the activity.
- Please see the University's Wireless LAN Policy for further information.

Event Coordinators shall not make any technology-related commitments to customers without written approval from NST.

2.3   Design Considerations

When opportunities are presented to remodel a building or construct a new building for a department, everyone involved in the process will have an opportunity to influence the design of the technology that goes into the building.

NST needs to receive constructive feedback and input to be sure that all needs are met.

As future technology needs for a new or remodeled building are being evaluated, please consider the following key points:

2.3.1 STANDARD FEATURES

Every new building will be designed to include the following features:

- Complete wireless network coverage throughout the building.
- Every standard office will have one network outlet with two cables. Clemson's telephone system is a Voice-Over-IP (VOIP) system, meaning that it operates using the computer network. One network cable is sufficient for a VOIP telephone with the computer sub-fed from the telephone. The second cable is then available for another device (computer, printer, etc.).
- Analog telephone circuits will be provided for applications that require them, such as fax machines, life/safety devices, etc.

- Every meeting room will have cabled network services accessible at the conference table.
- Every classroom will have cabled network services accessible at the instructor's podium.

2.3.2 REQUESTED FEATURES

Please identify any needed features that are not included in the Standard Features list above. Some examples might include:

- Labs/Classrooms
- Digital signage locations
- Building automation
- Lighting control
- Door access
- Vending machines
- Study lounge requirements

- Research and program requirements
- Offices that require more network-connected equipment
- Other surveillance cameras, especially program-driven applications that are not necessarily required for security

2.3.3 NEW TECHNOLOGIES FOR EXISTING SPACES

From time to time, needs may arise within your department or program for new technologies or equipment. If any new equipment will connect to the campus network, we strongly encourage you to involve NST prior to procurement.

- NST will help evaluate the compatibility of the equipment with the campus network.
- NST will also help evaluate whether the existing cabling and other infrastructure in your space will support the new technologies.

If new infrastructure is required, the costs for that work must be carried by your program budget.

2.4 Administration

When plans are being laid for a new or remodeled building, please be aware of the following indirect commitments that are made:

- For every 50,000 square feet of building space that is added, one additional full-time technical support person is required to maintain and operate the building.
- For every 50,000 square feet of building space that is added, data center space requirements and other communications infrastructure requirements are increased by 5%.
- Every 8 to 10 years, the network equipment requires replacement due to obsolescence.
- Every 15 to 18 years, the telecommunication (network) cabling requires

replacement due to obsolescence.

The optimal design solution balances first cost and ongoing costs. Since the ongoing costs for the above requirements are typically not borne by capital funds, operating budgets must also increase in step with campus growth and technology improvements. NST is committed to strategies that optimize stewardship of the University's resources.

Please invite NST to participate early in the planning processes and to treat network services as a utility service to the building.

2.5 Facilities

2.5.1 COORDINATION

Facilities and NST have a mutual interest in the success of projects on campus. Regular coordination is essential to the project success and is key to reducing the life-cycle costs of University assets.

2.5.2 MEETING SCHEDULE

Facilities hosts the following meetings, which will be attended by a representative from CCIT NST:

- Capital Projects meeting – first and third Mondays of each month
- Renovation Projects meeting – first Tuesday of each month

The following topics will be on the agenda for each of the above meetings:

- Discussion about new projects
- Review the status of current projects
- Discussion of projects that do not have technology features, but which may offer attractive opportunities for expanding technology infrastructure
- Coordination of planned excavation activities
- Scheduling of planned service disruptions

2.5.3 INITIATING NEW PROJECTS

NST's definition of a successful construction or renovation project involving technology includes the following facets:

- NST involvement in developing the scope of the project, especially for Design-Build projects.
- Appropriate selection of technical features.
- Flexible solutions that are adaptable to support unknowable future requirements.
- Favorable first cost.

- Favorable long-term costs (life-cycle costs).

There are several points of coordination between NST and Facilities that help achieve the above objectives:

2.5.3.1 STANDARDS COMPLIANCE IS REQUIRED

All telecommunications infrastructure shall be installed in compliance with the requirements of the TDDG.

2.5.3.2 BUDGETING

NST stands ready to assist Facilities with the preparation of budgets for new projects. Please request NST involvement before finalizing any budgets.

Upon request, NST can provide a set of general guidelines for establishing project budgets, including both the Construction budget and the Furniture, Fixtures and Equipment (FF&E) budget.

2.5.3.3 NST INVOLVEMENT FROM START OF PROJECT

All additions or modifications to telecommunications infrastructure, regardless of the size or scope of the project, must involve the appropriate Clemson NST representative(s) from the beginning of the project.

All new construction projects require the involvement of the appropriate NST representatives from the beginning of the project.

2.5.3.4 DESIGN-BUILD PROJECTS

Before the Request-For-Proposal is published for a Design-Build project, NST must be invited to influence the development of the project scope. Otherwise, the Contract will be established with a scope that will likely not meet Clemson's telecommunications standards without expensive change orders.

2.5.3.5 SPACE ALLOCATION

All telecommunications infrastructure shall be installed in compliance with the requirements of this document.

In the life of a building, the cabling and equipment components of the technology infrastructure will be changed several times as advances occur and systems become obsolete. Therefore, in order to keep the life-cycle costs low, it is essential that spaces and pathways supporting the technology infrastructure are properly sized, properly located, and remain accessible.

Please pay close attention to the space requirements described in the TDDG for telecommunications rooms and cable tray clearances when allocating space for technology infrastructure in new projects.

2.5.3.6 INTERNAL BUILDING SYSTEM INTEGRATION

Significant technical advances have been made in recent years resulting in numerous systems that now communicate via the campus network. The following are examples of systems or processes that now require secure networking:

- HVAC/environmental control systems
- Mechanical/DDC control systems
- Security and intrusion detection systems
- Access control systems
- Surveillance video systems
- Infrared scanner systems
- Handling of personally identifiable information (PII)
- Financial transactions

Do not expect wireless networking to provide the capacity, reliability, or security required to handle these systems.

It is therefore crucial to the success of these systems that Facilities coordinate with NST during the planning and design phases to ensure that adequate network and infrastructure are included in the design.

2.5.3.7 FURNITURE

When furniture is procured and installed in office spaces, the furniture frequently obstructs access to the power and data outlets. Two examples of common problems are:

- Modesty panels are sometimes purchased unnecessarily for the side of the desk that is against the wall.
- Furniture is often placed so close to the wall that it is not possible to insert plugs (both power and data) into the outlets. A space of 3 inches is necessary in front of outlets (especially power outlets) in order to insert and remove plugs.

Please get input from NST regarding furniture decisions.

Any furniture containing built-in data jacks must have CommScope-compatible jacks.

2.6 Service Outages

Maintenance, upgrade, or construction activities sometimes result in service outages. It is usually possible to plan for these events in advance, but occasionally things do not go as planned.

2.6.1 PLANNED OUTAGES

Planned telecommunications outages shall be scheduled with NST at least three days prior to the outage. This lead time is required in order to reschedule the appropriate IT staff to support the outage.

2.6.1.1 CALL BEFORE YOU DIG

Before digging on the Clemson campus for any reason, the contractor performing the work shall contact the "Call Before You Dig" service (dial 8-1-1) to identify any existing underground infrastructure.

2.6.2 UNPLANNED OUTAGES AND DAMAGE TO EXISTING INFRASTRUCTURE

Construction, maintenance, and other activities may result in damage to existing telecommunications infrastructure. In this event, regardless of the cause or party responsible, whoever observes a damage situation shall immediately contact Clemson University Police Department (CUPD) at 656-2222.

The party responsible for the damage to the telecommunications infrastructure shall be responsible for the total cost of the temporary repairs and the full restoration/ replacement costs. Clemson NST will establish required deadlines for restoring service depending on the campus impact of the outage. Some outages could be sufficiently detrimental that immediate and continuous efforts would be required until the service has been restored.

All damaged infrastructure shall be restored to within the scope of the original design/installation parameters. This shall include, but not be limited to:

- All repair or replacement work performed by a certified cabling installation contractor of Clemson's choosing.
- All testing and recertification of the infrastructure for full compliance with the Clemson Telecommunications Infrastructure Standards and applicable fiber optic cabling warranty.

Please note that splicing will not constitute an acceptable repair for damaged fiber optic cabling. Damaged fiber must be replaced in its entirety.

NST retains the sole discretion to determine the repair or replacement strategy and urgency for the damaged infrastructure.

2.6.2.1 POST-RESTORATION ASSESSMENT

After completing the restoration of damaged infrastructure, an assessment process is conducted. It is hoped that through these processes, institutional learning will occur that will lead to fewer unplanned outages and disruption.

If the event involved Facilities – Utility Services, representatives from that organization will be invited to participate in the process.

2.7 Services for Third-Party Tenants

2.7.1 COORDINATION

Most third-party tenants occupying space in Clemson buildings require telephone and Internet services. While it might seem straightforward for Clemson to provide these services as a condition of the contract, there are several complications associated with providing these services, including:

- Handling of confidential information
- Quality of service expectations
- Loss of business due to service outages
- Support of commercial interests using State service resources

NST discourages providing these services within the lease contract. Instead, the following practice is much preferred:

2.7.2 INITIATING NST SERVICES

Providing telephone and Internet services for non-Clemson tenants will be evaluated on a case-by-case basis. One option is for the tenant to obtain services from a utility service provider.

A second option is for Clemson to provide the services to the tenant. In this case, Clemson telecommunications infrastructure shall not be accessible from tenant demarc facilities which may be located inside the tenant's space.

2.7.3 CONSTRUCTION TRAILERS

CCIT NST will provide an open Internet port (not behind a firewall) for construction trailers on campus job sites. Contractors desiring services shall contact NST to discuss their needs, and shall typically anticipate a minimum of two weeks for services to be established. The cost for installation and ongoing services will be billed to the project or contractor occupying the trailer.

Any Contractor-owned wireless (WiFi) networking shall not interfere with the Clemson campus wireless network. When NST notices interference, NST will alert the Contractor that the signal strength on Contractor-owned wireless access points (WAP) needs to be reduced or the WAPs turned off.

2.8 Documentation

2.8.1 AS-BUILT/RECORD DRAWINGS

When a construction project is completed, the as-built drawings or (preferably) record drawings need to be made available to NST as follows:

- Full-size hardcopy printed drawings, CAD Drawing Files, and PDF files depicting the portion of the drawing set that is applicable to technology. The full set is not required, just the sheets that depict the technology features of the project.
- Facilities shall maintain a network-accessible archive ("the Vault") of both CAD files and PDFs of the record drawings, organized by building. NST shall have unrestricted access to review the information via the network.

2.8.2 CABLE TEST REPORTS

At the conclusion of each project, the telecommunications cabling subcontractor is required (in the project specifications) to provide their cable test reports. The subcontractor is also required to register the manufacturer's warranty for the cabling infrastructure.

- Other technology subcontractors may also have similar test report and warranty requirements for their specialties.

The Facilities Project Manager should require the test results and warranty registrations at the time that record drawings are submitted, and prior to final payment. A copy of this information shall be provided to NST.