

# Summary of Modifications/Changes in this Update

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U.S. Department of Veterans Affairs ♦ Office of Construction & Facilities Management

## NUMBER, DATE, AND TIL EFFECTIVE DATE OF THIS VERSION:

June 1, 2023

## TITLE OF DOCUMENT:

OIT Infrastructure Standard for Telecommunications Spaces V4.0

## EFFECTIVE DATE OF VERSION BEING SUPERSEDED:

August 1, 2021

## DESCRIPTION OF DOCUMENT (previous title, number, other identifying data):

V3.1 July 1, 2021 Effective August 1, 2021

## SUMMARY OF CHANGES IN THIS VERSION:

The Infrastructure Standard for Telecommunications Spaces (ISTS) v4.0 updates from v3.1 include new sections for Telecommunications Enclosure (TE) specifications, antenna entrance rooms, IT power cords, fans and supplemental airflow augmentation devices, and physical access to telecommunications spaces. Data Center and Infrastructure Engineering (DCIE) has harmonized the Environmental Control Equipment Requirements section with the HVAC design manual. Additions for Basis of Design, TEs, and Antenna Entrance Rooms have been added to the Design Templates in Appendix B and the Request for Variance form has been updated. We enhanced the Structured Cabling section to differentiate between campus structured cabling and data center structured cabling. We clarified Telecommunication Room (TR) sizing and rack count for small clinical environments and non-medical spaces per serving area. There are many other minor changes to include updated references to industry standards, and updated language to clarify and provide more concise implementation guidance that can be found in the accompanying Summary of Changes spreadsheet.

The full list of changes is included in the following pages.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
1	1.3	1.3	The following paragraph was added to section 1.3 "All staff that routinely access telecommunications spaces require initial basic and annual telecommunications training. Area Managers and supervisors shall assign the approved annual list of OIT telecommunications courses corresponding to the role of the staff member."	Include a v4 requirement for basic and annual retraining for all staff that routinely access telecom spaces.
2	2	2	Section 2 has been updated to reflect the VA requirement to have a single converged networking model (OneVA).	OneVA LAN is going to drive the consolidation of other quasi-data center spaces into the single allowed data center per campus/facility.
3	3.3	3.3	Added the following note in section 3.3 "NOTE: Healthcare facility entrance rooms and antenna entrance rooms inherit the TIA-942-B Rating 3 redundancy requirements of the CSC data center facility that they support. "	Table 11 in section 3.3 needs to be reviewed to ensure that guidance for ERs and AHERs is correct. Entrance Rooms match the requirements of the data center supporting the facility.
4	4.4	4.4	Section 4.4 was updated to include EMI effects.	Consider disallowing colocation of EMI equipment. Advise on EMI effects and required standoff for cabling and switches located in spaces shared with transformers and electric motors. Use <a href="https://fms-corp.com/ac_emi_explained">https://fms-corp.com/ac_emi_explained</a> as an explanatory reference as necessary.
5	4.4	4.4	Added the following statement in Section 4.4 "Media types not expressly authorized by this Standard are prohibited for use except for in the direct interconnection of IT equipment within the same enclosure."	Although the standards prohibit the use of network equipment in enclosures, that prohibition has not stopped design and installation of non-standard one-off systems that do not use or require the use of structured cabling. Additional statements of prohibition can be further used to dissuade these practices.
6	4.4	4.4	Added the following paragraph to Section 4.4 "Shielded twisted pair media (e.g., STP, FTP, S/FTP) are not recognized to have any applicable use cases in typical usage in VA telecommunications systems. In addition to requiring specific additional interface equipment, having a higher procurement and	There are no identified applications for STP cabling (and its variations) in lieu of UTP cabling in VA telecommunications infrastructures. Technical reasoning for the use of STP is to reduce EMI/RFI to protect the signal from interference or to protect the signal from being intercepted. Neither of these is an identified concern in any known VA system, space, or application.

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			installation cost, and requiring bonding beyond the requirements for UTP, VA configuration management and maintenance capabilities are insufficient to ensure that the intended purpose of these types of media can be sustained."	
7	5.1	5.1	Created new section 5.1 Data Center Position Identification Standards. Relocated two paragraphs from the introduction of 5. Administration Standards to new 5.1 section. Demoted all current 5.1 sections one level.	The introductory paragraphs for section 5, Administration Standards, describe what should be a section 5.1 Identification Standards subsection, with existing 5.1.x.x sections all demoted one level. Section 5.2 correctly remains Management Standards.
8	2.3, B.2, B.4	2.3, B.2, B.4	Language has been updated in Section 2.3, B.2, and B.4 to reflect all provider organizations needing to be consolidated into the minimum number of operational spaces on the campus.	Expand on the collocation of IT equipment and systems from all provider organizations into the minimum number of operational spaces on a campus; that is, consolidated data centers..."
9	2.3, Annex B	2.3, Annex B	Language has been updated in Section 2.3, B.2, and B.4 to reflect all provider organizations needing to be consolidated into the minimum number of operational spaces on the campus.	Consider adding explicit language to the standard stating that there are not separate telecom spaces for different functions. All OIT, BM, and others use the same converged TRs and MCRs.
10	3.1, 3.2	3.1, 3.2	"Both the A/B UPSs shall be powered from generator-backed sources" has been added for 3.1 and "(for Rating 3 facilities)" has been added to 3.2.	Designs being planned currently are misinterpreting the Table 6/7 information that buildings with the Rating 3 data centers have one commercial and one generator source and applying this to the power to the UPSs.
11	4.1.1	4.1.1, Table 9	Section 4.1.1, Table 9 (Building Specifications for Common Telecommunications Spaces), changed attribute "Slab to Floor Above" to "Slab to Floor Above (MSC, CSC, CDC). Changed attribute "Raised Floor to Ceiling" to "Finished Floor to Lowest Structural Obstacle." As NSCs and TRs/ERs in leased/legacy space may not have the ability to get to 16' clear,	The generic extra small and language in the LDN state the clear height must be a minimum of 12', 16' recommended. May be a violation of the 16' minimum, 12' legacy height requirement. Consider altering to 12' legacy and leased.

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			this should meet the LDN requirement and satisfy all space height considerations.	
12	4.1.2	4.1.2	This following sentence was removed from Section 4.1.2 "Determination and maintenance of categorization of enterprise data center facilities shall be conducted by National Data Center Operations & Logistics (NDCOL) in alignment with their mission to report Department data center information to the Office of Management and Budget (OMB)."	First paragraph of implementation guidance for section 4.1.2 Data Center Layout Standards does not apply to that section. Suggest that it relates to something in the Administrative Standard for categorization of facility type (NSC, MSC, CSC, CDC), but that it may not be relevant to this standard any longer. Consider whether it should just be deleted.
13	4.1.2, Table 9	4.1.2, Table 10	Added the Floor Stands attribute to the table with the following specification "Manufacturer recommended floor stands for heavy equipment when raised access floor is used." We also added the following statement to Implementation Guidance "Engineered floor stands are required for CRACs, UPS battery cabinets, and other equipment capable of causing floor loading issues in raised floor environments."	Engineered floor stands for CRACs/UPS battery cabinets and other equipment capable of causing floor loading issues should be mandatory in the raised access floor environment, even if the underfloor is not being used for utility distribution. This will apply mainly to retrofits and equipment replacement efforts. The use of additional pedestals to support stringers and floor tiles directly may be considered for some applications.
14	4.1.3	4.1.3	Section 4.1.3 has been updated to include the 19" rack mount requirement.	Specify that it needs to be 19" rack-mounted and mount in the provided racks, not wall-mounted or in separate vendor-provided TEs or wall racks.
15	4.1.3	4.1.3	Table 12 "Non-medical Space Racks and Telecommunications Room Sizing per Work Area Outlet Density in Supported Serving Zone" has been added.	Codify the size of the TRs vs. the number of WAOs and discuss that the sizing intends to allow a corresponding increase in density of other stakeholders' equipment. Also see 3/1/21 email "TR Sizing revisions"

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16	4.1.3	4.1.3	Section 4.1.3, Telecommunications Room section Implementation Guidance, was updated for more concise footprint related guidance.	TR sizing of 100SF can also be applied to other classifications of supported facilities (admin offices, VBA and NCA facilities, vet centers, and similar). If this is a primary VARO, continue to say that a 140sf NSC is needed. If it is a satellite space, a smaller space may suffice. Lease minimum sizes for a Health Care Center TR is 170 sq ft. The minimum size for other spaces is 80 sq ft. Understandably, a health care facility of less than 5,000 sq ft, is not providing many of the services of a typical health care facility. So, a 170 sq ft TR may not be warranted due to the fact that telemetry, nurse call, and other services are not being provided. So, in keeping with VA requirements, we require a 100 sq ft TR for facilities under 5,000 sq ft. That allows for two network racks. Then for each additional 5,000 sq ft, an additional 40 sq ft is added to allow for two additional racks. The form factor needs to be 10' x 10', then 10' x 14', etc. keeping the 10' width to allow for a row of racks with a 3' clearance in front of and behind the racks. This also allows for three foot of clearance at the ends of the row
17	4.1.3	4.1.3	The implementation guidance for section 4.1.3 has been updated to reflect these accepted suggestions.	Change TR sizing text to reflect form factors as well as square footages to prevent projects from selecting minimum requirements of one or the other.
18	4.1.3	4.1.3	Section 4.1.3 implementation guidance was expanded to better explain clearance requirements for TRs.	"add an additional 20 sq ft" to add an "additional 26 inches linearly" for each additional rack after four.
19	4.1.3	4.1.3	Section 4.1.3 implementation guidance was expanded to better explain clearance requirements for TRs.	Keep the 80/100/120/140sf TR models, improve clearance rules. Front and rear clearances are required to be 3', which drives a 10' depth in all circumstances. Due to the 6" vertical cable managers between and around all network channel racks, side clearance requirements are 3' on one side and the other side not abutting the wall to permit access to cable management.

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20	4.1.3	4.1.3	Section 4.1.3 was revised to provide updated guidance on TR requirements.	EHRM projects are building 10x10 TRs that HEFP only intends to have house OIT equipment; when relocating TRs, the existing substandard TRs become "engineering TRs" with their existing substandard conditions. How these are connected to backbone and horizontal distro is unclear, as that is being replaced/abated. It is not in scope of the EHRM effort to relocate the non-OIT IT systems to the new TRs, but it is a requirement. v4 language needs to clarify even more strongly that separate TRs are not allowed; not only no chain link fences, but certainly not separate spaces that aren't supported appropriately. The OneVA LAN position paper needs to address how this can be accomplished, and at the facility, VISN, or HEFP level follow-on projects programmed to relocate the residual non-OIT systems to use the campus backbone. Fire protection and security can be programmed for replacement to the TRs at lifecycle, but no other systems should be left.
21	4.1.4 Implementation Guidance	4.1.4	Wording has been changed from "exception" to "variance."	Change "exception" to "Variance" (multiple) for consistency with Appx A.
22	4.1.4	4.1.4	The following sentence was added into section 4.1.4 "A maximum of 96 WAOs can be supported by a standardized TE. Each data jack in a workspace telecommunications outlet, wired back to the patch panels in the TE, is considered a WAO for these purposes."	Usage. A maximum of 96 WAOs can be supported by a standardized TE. Each data jack in a workspace telecommunications outlet, wired back to the patch panels in the TE, is considered a WAO for these purposes.
23	4.1.5	4.1.5	Wording has been changed from "6 ft apart" to "66 ft (20m) apart."	Correct typo [Entrance rooms] "located 6ft apart" The actual distance referenced should be written as "66 feet (20 meters)" to remove ambiguity.
24	4.1.5	4.1.5	Section 4.1.5 has been updated to better portray entrance room requirements.	Corrections need to be made to Entrance Room guidance. Existing language was written using a basis of the hospital being the building under consideration; other types of spaces exist and the language must account for all of the possibilities so far as possible.

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25	Sec 4.1.6, para 1	4.1.6	PSRDM is not using the most recent terminology used throughout the VA. Changed to "and Video Surveillance Systems (VSS) including Closed Circuit Television (CCTV)/Security Surveillance Television (SSTV), etc." Added to acronym list.	Remove "Closed Circuit Television (CCTV)". PSRDM only uses the SSTV reference for video surveillance systems.
26	NA	4.1.6	4.1.6 Antenna Entrance Rooms was written to define salient characteristics of the headend space.	Consider specification of a complete TR for the headend space.
27	4.1.6	4.1.6	Added detail to section 4.1.6 "Antenna Entrance Rooms are a subset of the NSC classification archetype with less stringent environmental control requirements. Antenna entrance rooms are considered TRs with additional requirements to match their function(s) in supporting special telecommunications equipment."	Add classification for antenna entrance rooms.
28	4.2.1	4.2.1	The following statement was added to Section 4.2.1 "Active equipment installed in the VA telecommunications environment shall minimally be conFigd with dual-redundant Power Supply Units (PSU), excepting carrier equipment placed in entrance rooms and antenna entrance rooms. PSUs shall be rated for 208V input and conFigd to operate in shared load mode rather than redundant mode to balance A/B power under normal operating conditions."	Implied A/B power distribution is insufficient. Explicitly call out dual PSUs for active equipment to be installed in the VA telecom environment, excepting carrier equipment in entrance rooms. This pushes the 2N to the busbar internal to the device and eliminates the need for ATs in otherwise single-PSU equipment. PSUs must be rated for 208V input and should be conFigd to operate in shared load mode rather than redundant mode to balance A/B power under normal operating conditions.
29	4.2.1.1	4.2.1.1	The visual queue "Note:" has been added to highlight the requirement.	"Only DCIE is authorized to approve installations exceeding the SD level." Suggest using visual queues to draw attention to this.

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30	4.2.1.1, Fig 3, Definitions	4.2.1.1, Fig 3, Definitions	Wording has been changed from "busbar" to "track busway" in 4.2.1.1 and definition added.	Change "busbar" to "track busway" or "busway and add to Definitions. "Busway as defined by the National Electrical Manufacturers Association (NEMA) is a prefabricated electrical distribution system consisting of bus bars in a protective enclosure, including straight lengths, fittings, devices and accessories. Busway transports electricity and connects to electrical gear such as switchgear, panelboards and transformers." "Track busway is a continuous rail design where tap-off boxes can be installed or removed nearly anywhere along the busway system. The tap-off boxes come equipped with cord whips and fixed receptacles allowing for power distribution to equipment below the busway."
31	4.2.2	4.2.2	"Ultimate" and "design" were added into the sentence "Facility UPS systems shall have a planned design load which covers 100% of the ultimate IT equipment electrical loads design in the data center sized to provide 10 mins of backup capacity."	Recommend adding "ultimate" between "covers 100 percent of the" and "IT equipment electrical loads"
32	4.2.2	4.2.2	The guidance is important and will remain. We added "IAW 4.2.2.1" to the end of the sentence.	Recommend moving cascaded UPS statement into 4.2.2.1 which covers cascaded UPS systems.
33	4.2.2	4.2.2	Section 4.2.2. was updated to indicate Li-ion battery systems are not authorized for VA data centers.	Determine whether Li-ion batteries for UPS systems are appropriate, whether they can be put in CRs or need dedicated spaces, and address fire detection/suppression requirements. Review FMEA regulations. At the current time, neither the FPDM, HVAC DM, nor the EDM address Li-ion support requirements. Until those are coordinated, it would be unwise to authorize their use for static UPS purposes, as we could be creating inadvertent risks to the facilities.



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34	4.2.2	4.2.2	Removed the following from Section 4.2.2 "Because surge and startup loads are not indicated by monitoring steady-state operational UPS usage conditions, actual loading on the UPS system is limited to 85 percent of design capacity with one system offline; that is, on a 1000 kVA system, when 850 kVA of equipment is shown on the UPS meter, the system is considered 'full' and no more IT equipment shall be added to the facility." We also removed the Design Load Limit secondary attribute and specification from Table 13.	Intended to be for operational replacement planning. UPS systems are built conservatively. Most have overload capabilities that will cover the surge startup loads for a limited amount of time, and this is actually explicitly called out in the Div spec for UPS systems. We made suggestions in that spec to reduce the amount and carrying time. Including this information has only served to confuse designers and have them provide oversized UPS systems to support ultimate design loads well beyond the ultimate loading conditions that we'll never reach anyway.
35	4.2.2	4.2.2	Table 13 has been moved from section 4.2.2.2 to section 4.2.2.	Table 14 is out of place. It should be located in section 4.2.2, not under 4.2.2.2.
36	4.2.2	4.2.2.1	Section 4.2.2.1 was updated to include the dangers of cascaded UPS systems and their impact on the Emergency Power Off (EPO) requirement.	EPO/MPO requirements are complicated and are most likely the domain of the EDM, not the ISTS. Review of all CFM DMs finds no requirement for an EPO or MPO at all, likely in conflict with article 645 of Code.
37	Sec 4.2.2.2	4.2.2.2	Changed to "Rack-mounted UPS equipment requires a network interface card for connection and monitoring by the central Building Automation System (BAS) and set for alarming on certain battery conditions."	"Rack-mounted UPS equipment is typically produced with a network connection..." This is nearly always a purchase option, not a default inclusion. Indicate that the requirement is to ensure the NIC card option is provided.
38	4.2.2.2	4.2.2.2	The introduction to section 4.2.2.2 was rewritten to provide more concise guidance.	4.2.2.2 Battery Monitoring needs some work. We say here that a battery string can last for 10 to 20 years, which is correct only for flooded VLA batteries. Further, modular UPSs with internal battery monitoring are acceptable. We need to determine a way to get battery alarms onto the BAS so someone actually fixes them.
39	4.2.4	4.2.4	New Table 15 created to separate busway distribution from whip distribution. Added bullet stating "Busways oriented and tap enclosures installed to maximize serviceability" under busway orientation.	Clarify if busways are installed to allow taps to be most serviceable. They are typically able to be installed facing either way.

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			Changed specification to read "Size selected based on full load anticipated for all enclosures plus 30% phase imbalance allowance" under amperage.	
40	4.2.5	4.2.5	Added the authorization of Zone Power Distribution Units (zPDUs) in Section 4.2.5	Consider allowing L21-20 direct plugs w/o 30A Zone PDU. Consider requiring upsized conductors for 30A service for future flexibility.
41	4.2.7, 4.2.8	4.2.7, 4.2.8	Section 4.2.7, Table 15 (Vertical Rack PDU Standards), change Output Voltage specification from 110/208V to 208V. While 3-phase power can provide 120V (L), neither of the types of rPDUs specified have 120V outlets. All power distribution is implied to be specified as 208V (L-L) through the use of this equipment. This is also noted as an evaluation factor for the specified equipment. Nowhere do we expressly prohibit the use of 120V (only) rated power cords.	We want to use only IEC320 power cords, others by exception only for all equipment
42	4.2.8 Implementation Guidance	4.2.8	Wording has been changed from "All modern IT equipment power supplies are operable at 208 V. VA standards specify, and all modern IT equipment has dual (A/B) redundant power supplies." to "Enterprise-class IT equipment power supplies are operable at 208 V. VA standards specify, and modern enterprise class IT equipment has, dual (A/B) redundant power supplies."	Statement is too broad. "All modern IT equipment power supplies are operable at 208 V. VA standards specify, and all modern IT equipment has dual (A/B) redundant power supplies." Rephrase.

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43	Multiple	4.2.8	Removed "IT equipment Power Cords Specification" and the first two paragraphs of the implementation guidance from section 4.2.7 and created Section 4.2.8 for IT Equipment Power Cords.	Move equipment power cord information from proposed Div 27 spec into v4. A. Concept: 208V IEC 60320 power cords connect the Rack PDUs to the power supplies in the active IT equipment. All IT equipment power supplies are operable at 208V. All IT equipment has dual (A/B) power supplies. B. Description: 208V IEC 60320 power cords. C. Connectors: Dependent upon actual equipment requirements. 1. C13 at IT equipment power supply and C14 at Rack PDU (nominally "C13/C14"). 2. C15 at IT equipment power supply and C14 at Rack PDU (nominally "C14/C15"). 3. C19 at IT equipment power supply and C20 at Rack PDU (nominally "C19/C20"). D. Amperage: 10A (C13/14 and C14/C15), 16A (C19/C20). E. Color: One (A side) black, one (B side) a distinctly different color. White is typical. Comply with any established local color schema. 1. Identify existing phase balancing on the Rack PDUs from the onboard meters. Determine which phase-grouping should receive the new equipment power cords to maintain or improve phase amperage balancing. 2. Install the A side (black) power cord from a Rack PDU on the left side of the rear of the enclosure to the corresponding IT equipment power supply. 3. Install the B side (white or other color) power cord from a Rack PDU on the left side of the rear of the enclosure to the corresponding IT equipment power supply. 4. Power cords should be installed into the same outlet and phase-grouping on both A and B Rack PDUs.
44	4.2.9.2	4.2.9.2	Rewrote paragraph to indicate a requirement for all racked equipment, such as LAN switching equipment, to be bonded if directed to do so by manufacturer's requirements. Also added the acronym Unit Bonding Conductor (UBC).	The following paragraph does not flow with this topology section. Should it fall under implementation section? This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. These devices will be bonded to the RBB in the same rack. Each device will have a dedicated Unit Bonding Conductor (UBC). The UBC will not be shared.

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45	4.2.9.2	4.2.9.2	Rewrote paragraph to indicate a requirement for all racked equipment, such as LAN switching equipment, to be bonded if directed to do so by manufacturer's requirements. Also added the acronym Unit Bonding Conductor (UBC).	Change "grounding" to "bonding". This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. These devices will be bonded to the RBB in the same rack. Each device will have a dedicated Unit Bonding Conductor (UBC). The UBC will not be shared.
46	4.2.9.2	4.2.9.2	Section 4.2.9.2 bonding language updated to reflect access flooring pedestals must be bonded. Computer rooms will contain an SBB. The connection of the TBB to the SBB will utilize exothermic welding, listed compression two-hole lugs, or listed exothermic two-hole lugs. The connection of conductors for bonding telecommunications equipment and telecommunications pathways to the SBB shall utilize exothermic welding, listed compression two-hole lugs, or listed exothermic two-hole lugs. Access flooring pedestal must be bonded per manufacturer specifications, AHJ, code requirements, and or Section 7.8 of ANSI/TIA-607-C.	Update Section 4.2.9.2 bonding language to reflect access flooring pedestals must be bonded.
47	4.3.1	4.3.1	Section 4.3.1 was reworded to focus on the energy efficiency for telecommunications spaces.	Need new introduction section for mechanical and environmental conditioning standards.
48	4.3.1.1	4.3.1.1	Eliminated section 4.3.1.1; the replacement EO does not specifically address individual items that need to be accomplished.	EO13834 is effectively revoked by EO13990.
49	4.3.3	4.3.3	Updated language in Section 4.3.3 for clarification.	CFD is not to be used simply to show that a design can be made to work. It is a primary design tool to be used iteratively to shape the design model and to improve it to minimize energy utilization in the space.

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50	Sec 3, Implementation Guidance	4.3.5	Wording has been changed from "must be accomplished" to "is required."	"Computational Fluid Dynamics (CFD) modeling must be accomplished to understand the airflow..." Suggest replacing "must be accomplished" with "is required". Consistency with contract language.
51	4.3.5	4.3.5	Section 4.3.5 Environmental Control Equipment Requirements, added evaluation criteria and implementation guidance.	We need 5kW per rack, however in aggregate we don't need 5kW for each of four racks. Update standard and TR design checklist with new language, applicable for both new construction and renovations. 1 rack TR = 5kW (e.g. single 5kW cooling unit). 2 rack TR = 7kW (e.g. 3.5kW x2 cooling units). 3 rack TR = 8.5 kW (e.g. 3.5kW + 2.5kW x2 cooling units). 4 rack TR = 10kW (e.g. 2.5kW x4 or 5kW x2 cooling units). Other designs meeting these maximum expected aggregated load levels are acceptable. Multiple smaller units will assist in avoiding equipment freeze-up in some types of equipment.
52	4.3.6	4.3.6.11	Added section 4.3.6.11 Fans and Supplemental Airflow Augmentation Devices.	Explicitly prohibit the use of fans and supplemental airflow augmentation devices without CFD confirmation of their benefits and costs in the proposed operating environment.
53	4.3.6.12	4.3.6.12	Section 4.3.6.12 has been edited to say "System design shall comply with ANSI/ASHRAE Standard 188 (current version) and VHA Directive 1061 for Legionella control. Defer to the HVAC Design Manual for additional guidance."	Remove humidification (dry fog) system based on Legionnaire's issues, despite CRACs having the same issues.
54	Sec 4.3.6.3, para 2	4.3.6.3	Wording has been changed from "overhead cabling is" to "overhead cabling must be."	Suggest revising "Overhead cabling is used whenever possible..." to "Overhead cabling must be used whenever possible..." As written, it assumes a current state when the desire is to revise current state to the desired state.

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55	4.3.6.6	4.3.6.6	Wording has been changed from "CRACunit" to AC unit."	This example is confusing when it was stated earlier that 10Ton should be a minimal CRAC size. Alternative air conditioning types are allowable provided they increase the efficiency of the HVAC system and do not provide more cooling than the ultimate design load of the data center (for example, do not install a 5-ton CRACunit in a NSC designed to contain one ton of IT equipment).
56	4.4.1	4.4.1	Section 4.4.1 has been revised to support the VA requirement for a single converged networking model (OneVA).	VA is moving towards a single converged networking model (OneVA) to support all of the telecommunications needs of all consumers of these services at a single campus or facility. Installed cable plant systems (both ISP and OSP) are designed and intended to be shared among the multiple possible users (OIT, biomed, FMS, VA police, et cetera). Individual projects for systems for any user at the campus or facility shall follow the structured backbone and horizontal distribution model described in these Standards, use equipment and components described in Division 27 specifications and these Standards, utilize already-installed backbone media where it is compliant with these Standards, and follow established OIT processes for isolation architectures to reduce operational risks both to user systems and to the VA network. Separate stand-alone networks are not authorized to be installed. All VA systems shall migrate to the OneVA networking model when replaced or significantly updated. DCIE are stakeholders in every project involving the physical cable plant installed at a campus or facility, including biomed, FMS, and VA police projects that intend to install additional cable plant media, and shall be included in project review to ensure compliance with OneVA networking practices.
57	4.4	4.4.1.1	Added a new the following statement in Section 4.4.1.1 "Due to a broadly-demonstrated inability to effectively manage and maintain them, the use of Intermediate Cross-Connects (ICCs) between the MDAs and TRs is prohibited in VA campus structured cabling systems."	Language to stop the proliferation and continued use of unsustainable telecom spaces needs to be added to the standard.

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58	4.4	4.4.1.2	Section 4.4.1.2 Computer Room Structure Cabling states "Data center structured cabling systems are required in the MSC, CSC, and CDC facility classifications"	Explicitly state that structured cabling meeting the requirements described here and in App B is required in all CRs, and unstructured cabling (including to isolated systems) is prohibited. It does not seem likely that we can require structured cabling in a 4-rack NSC.
59	4.4	4.4.1.2	The following part of 4.4.1.2 was modified to read "Data center structured cabling systems are required in the MSC, CSC, and CDC facility classifications. This approach is consistent with ITS industry standards, and it supports the SD LAN and data center network design baselines. These structured cabling systems shall use a redundant, diversely-routed end-of-row (EOR) HDA distribution model supported by redundant MDAs where the main cross-connect is located as defined by ANSI/TIA 942-B specifications."	Differentiation of campus area network structured cabling and MCR structured cabling will not be clear to readers of the document. This language will explicitly require the installation of MCR-internal structured cabling in the top 3 archetypes, making it a contract requirement during projects.
60	4.4	4.4.1.2	The following has been edited in section 4.4.1.2 for clarification "The use of pre-terminated structured cabling elements is required in the data center. Specification of data center structured cabling (both copper and fiber) requires calculation of total length of the link pathway in all dimensions (orthogonally) from dimensionally accurate plans. Procure structured cabling elements to not exceed 6 ft (2 m) at each end from the calculated length to avoid coiling of excess cabling."	Clarify the difference between structured cabling internal to the computer room and external to it (campus cable plant).
61	4.4	4.4.1.2	The following was added to section 4.4.1.2 "All IT equipment will be supported from the HDA elements using the structured cabling system. All networking equipment will be located in the network channel racks and all server/storage equipment will be located in the server cabinets provided in these designs."	TORs are prohibited in a number of places by statement that the networking equipment must be in the network rack elements, and these statements provide positive reinforcement as well as explicit prohibition on TOR usage.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
			NSCs using a server cabinet shall follow a modified structured cabling environment appropriate to the specific requirements of the environment. The use of top-of-rack (TOR) switches and similar networking equipment within server cabinets is prohibited."	
62	4.4.10, Implementation Guidance	4.4.10	Wording has been changed from "no phone outlets" to "no RJ-11 phone outlets."	Suggest revising "No "phone outlets" are specified in this standard to "No "phone outlets" (RJ-11) are specified in this Standard."
63	4.4.9	4.4.10	Added the following statement in section 4.4.10, "Each telecommunications outlet/receptacle connected by media to a patch panel in the supporting TR is considered a single WAO, so a faceplate at an end-user location may typically have two WAOs. " We also changed "The typical standard density WAO will consist of two RJ45 interfaces " to "The typical standard density work area telecommunications data faceplate will consist of two RJ45 interfaces (two WAOs)."	Section 4.4.9 "the typical standard density WAO will consist of two RJ45 interfaces" is technically incorrect. Clarify what a WAO is (one cable, one data drop, etc.) and use different language here. Check App B drawings for the same issue.
64	4.4.9	4.4.10	Edited the following paragraph in section 4.4.10 "The typical standard density work area telecommunications data faceplate will consist of two RJ45 interfaces (two WAOs). This provides both redundancy and support for future equipment requirements. IP phone systems used in VA shall have gigabit throughput capabilities and be connected in-line between the WAO and workstation. This allows the workstation to interface with the network via the phone base at the full planned bandwidth of the horizontal channel media and leaves one RJ45 at the faceplate available for future use."	Need to address the cabling associated with VOIP phones and concur that the desktop computer needs to be plugged into the VOIP phone. Unless UC has other inputs, make this design the standard in the next version to limit the amount of UTP cabling required for separate VOIP systems at the desktop.



Final ID	Reference	Final Ref	Change(s)	Reason for Change
65	4.4.11, 4.4.12	4.4.11, 4.4.13	Renamed section 4.4.12 from Backbone Distribution to Fiber Optic Backbone Distribution. Inserted new section 4.4.12 Copper Backbone Distribution. Provided clarified guidance on copper backbone distribution.	Per NEC the grounding solution must be located as close to the building entrance as practical. Suggested equipment is a wall-mounted protector enclosure (tiitech/product/505e) with 110 terminations. These are intended for 4-pair punchdown, so a 505E24 module only satisfies 6 cables total. For analog-only use, this seems okay.
66	4.4.12, 4.4.14	4.4.12, 4.4.15	Section 4.4.12 Server Cabinets and 4.4.14 Network Equipment Cabinets, implementation guidance edited to state, "...with VEDs shall be specified and provided for deployment to computer rooms with overhead return air ducting systems installed." Additional language needed should state: "In facilities with these supply/return air separation systems, cabinets shall be specifically designed to match the needs of the engineered environmental control system; where a provider wants to install a non-standard cabinet, re-racking of equipment into a standard cabinet is required."	We need to be more specific about the use of non-standard server cabinets, since we are now designing with return air ducts. Providers are going to have to provide cabinets with compatible VEDs in these facilities, or we will have to mandate re-racking of equipment into standard cabinets to maintain the environmental design of the facilities.
67	4.4.12	4.4.13	Added the following statement to Section 4.4.13 "Rear rails of server cabinets shall be set not less than 6 in. from the rear door(s) of the cabinet to allow space for rear-mounted angled patch/distribution equipment in the Equipment Distributor and to accommodate up to four vertical rPDUs in high density applications."	Address construction of server cabinets to ensure that rear rails are recessed from the rear doors far enough to accommodate angled patch panels and 4 vertical rack PDUs. Determine when to authorize flat patch panels in legacy racks where the rails are not recessed far enough. Discuss how to retrofit vertical rack PDUs in these cases as well, where it will impact the doors closing.
68	4.4.12	4.4.13	Revised section 4.4.13 for clarity on copper backbone.	Revisions required based on tentative finalization of copper backbone white paper.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
69	4.4.12.1	4.4.13.2	Section 4.4.31.2 was created and states "Terminate backbone to 24-port UTP patch panels on both ends. Lightning surge protection is required when copper backbone transits outside plant (OSP) pathways that could expose the conductors to electrical transients. For copper backbone applications where surge protection is required, use only flat (not angled) 24-port patch panels. Adjacent to each 24-port UTP patch panel requiring protection, install 1U rack-mount 24-position surge protector equipment."	Revisions required based on tentative finalization of copper backbone white paper.
70	4.4.12	4.4.14	Added the following statement in section 4.4.14 "Active networking equipment shall not be installed in server cabinets. This includes fabric interconnects, fabric extenders, and other types of equipment (e.g., TOR switches) used for network distribution, even when part of a 'converged' system. Except for in authorized wall-mounted TEs, active networking equipment shall only reside in designated network racks and network cabinets (HDAs and MDAs in data centers), using structured cabling systems to distribute network services to IT equipment in server cabinets."	Explicitly define fiber extenders, fabric interconnects, and other types of equipment as networking equipment prohibited as other switches from being in the server cabinets, even when as part of a 'converged' system.
71	4.4.14	4.4.14	Section 4.4.14 added, "Active networking equipment shall not be installed in server cabinets."	In addition to requiring network equipment only be placed in MDA/HDA enclosures, explicitly prohibit it from being installed in server cabinets.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
72	4.4.13	4.4.14	Added the following paragraph in section 4.4.14 "VA designs and implements telecommunications spaces fully built out with IT equipment enclosures, power, cooling, and structured telecommunications cabling. Install all IT equipment in these standard enclosures following the VA structured cabling model."	With EHRM modernization, VA is building out complete data centers. In these environments no vendor-provided cabinets/racks should be provided. IT equipment should instead be racked into VA-provided standard IT equipment enclosures. We are no longer designing spaces for vendors to roll their own racks into our data centers. These rack/power solutions are an unnecessary increase for VA to be paying for.
73	4.4.12, 4.4.13, 4.4.14	4.4.14, 4.4.15, 4.4.15	Sections 4.4.12, Server Cabinets, 4.4.13, Network Racks, and 4.4.14 Network Equipment Cabinets, replaced secondary attribute "Rack Unit" or "RU" with "Rack Units" to be consistent.	Use same language in tables for different enclosures.
74	4.4.12, 4.4.13, 4.4.14	4.4.14, 4.4.15, 4.4.16	Sections 4.4.12, Server Cabinets, 4.4.13, Network Racks, and 4.4.14 Network Equipment Cabinets, replaced existing implementation guidance section sentence "Enclosures shall be equipped with seismic bracing when deployed in areas prone to earthquakes or as required by Federal regulation or other AHJs and best practices" with new language "Where required by VA Seismic Design Requirements (H-18-8), enclosures require seismic restraint by bracing, anchorage, or similar practice."	State in table that seismic certification is not a requirement but that bracing may be depending on installation location (refer to H-18-8).
75	4.4.14	4.4.15	Added the following statement to section 4.4.15 "Two-post and four-post (open wall) racks are prohibited for use in VA telecommunications spaces. Replace all existing racks with specified network equipment (channel) racks or network cabinets (depending upon the application)."	Prohibit two and four post racks.
76	Sec 4.4.17, Implementation Guidance	4.4.17	Intro added "Telecommunications Enclosures (TE) are permitted for use in non-clinical spaces in lieu of standard TRs when meeting	It's not explicitly clear if TEs are permitted for clinical versus non-clinical spaces. As written, it could be interpreted as permitted in clinical spaces.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
			the established criteria. They are not permitted in clinical spaces."	
77	4.4.15	4.4.17	Created section 4.4.17 Telecommunications Enclosures (TEs). These specifications define a standardized TE for use in specific limited circumstances where a standard TR is not feasible or warranted.	Codify the use of standard Telecommunications Enclosures and their requirements. State that they are approved for installation by exception (variance) only, except that they have been approved for enterprise-wide use in NCA field facilities, Fisher House buildings, and VHA mental health admin facilities (Vet centers).
78	4.1.4	4.4.17	The following statement was added to section 4.4.17 "Non-diverse pathways for backbone media may be served by a single TE, but the pathway must still contain redundant fiber backbone media (both A/B backbone elements present)."	Clarify that although a single non-diverse pathway may be used for buildings meeting these criteria, that the backbone must still be redundant (both A/B backbone elements present).
79	4.4.1	4.4.2	Added the following bullet in Table 31 "Modular Plug Terminated Link (MPTL) authorized for media connecting to Wireless Access Points (WAPs)" and the following statement in implementation guidance "Distribution to WAP locations may be terminated Modular Plug Terminated Link (MPTL) rather than using 'biscuits,' eliminating the requirement for a connecting patch cord."	Add MPTL as a preferred alternative to biscuits.
80	4.4.1	4.4.2	Removed "" pre-terminated with split" and "preferred" leaving just "8P8C" in Table 31	Remove language on 8p8c connectors being 'split' - could be proprietary to Ortronics components.
81	4.4.1	4.4.2	The following sentence was moved from section 4.4.2 to 4.4.3 "Patch panels shall serve as transition points for all horizontal cabling in equipment distributors and horizontal distributors and throughout the MDAs for all backbone and horizontal levels." The remainder of the paragraph was removed.	Section 4.4.1 implementation guidance mixes and matches when discussing horizontal distribution in the MCR and from TRs to WAOs. Clarification of the two different uses is warranted. Next sentence calls out "two simultaneous A/B redundant, diverse distribution paths." This is inaccurate except for the NFPA 99 Cat 1 exception; there is no diverse path routing requirement for UTP, and including discussion of such in the specification for the media itself would be the wrong place for it anyway.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
82	4.4.2	4.4.3	Added the word "pathway" into Section 4.4.2 UTP Patch Panels following text "small (five RUs or fewer)." The following bullet was added to table 40 "Rear rails installed with not less than six in. clearance to inside of rear cabinet doors to accommodate ED patch panels."	ED patch panels need to be flat as the rear rails may not allow angled PPs for door closure; this requires rear shelves and front cable managers, as EDs are mounted in the rear of each server cabinet. Currently, ISTS only allows angled patch panels (4.4.2). Also, sheet 25 App B calls out angled patch panels, and does not specify rear mounting of the EDs. In pathway racks, angled is specified. Spec development changed this guidance to moving the rack rails inward.
83	4.4.1, 4.4.2	4.4.3	Added the following statement to the implementation guidance of section 4.4.3 "Patch panels shall serve as transition points for all horizontal cabling in equipment distributors and horizontal distributors, and throughout the MDAs for all backbone and horizontal levels."	Correct typo/language in text.
84	4.4.2	4.4.3	The following bullet was added to section 4.4.3 "Channel installations including patch panel equipment on each end) certified to media performance category using level IIIe test equipment per ANSI/TIA-1152"	We want to ensure that UTP installations are tested per the white paper requirements; testing type is not called out elsewhere in the standard. This is located in the patch panel section as we are looking for permanent channel installations, where the appropriate place to test is with PPs on each end already in place.
85	4.4.2	4.4.3	Section 4.4.2 title. Removed "Standards" from title of section to align with other sections.	Fix title of section to align with other sections.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
86	4.4.3	4.4.4	Section 4.4.3, UTP Patch Cords, replaced implementation guidance with clarifying language	Channel length using 28ga cables is reduced, and other factors must be taken into account. When used: 1. Total allowable patch cord length is reduced from 10 meters (32) to six 6 meters or 20 feet. (See Table 1. ANSI/TIA-568.0-E) 2. The total channel (patch cords plus permanent link) length maximum is, therefore, reduced from 100 meters (321 feet) to 96 meters (315 feet) 3. The maximum bundle size (cables bundled together with hook and loop straps) is QTY twelve. (See Annex Q. TIA-568.2-D-2) 4. Per VA and industry standards concerning DC powering over UTP, Category 6A 4-pair balanced twisted-pair cabling as specified in ANSI/TIA-568-C.2 and ANSI/TIA-568-C.2-1 is required media for the permanent link. (See Annex A. TIA TSB-184-A) 5. The patch cord performance category must meet or exceed the performance of the permanent link (regardless of patch cord OD).
87	4.4.5	4.4.5	Section 4.4.2 Unshielded Twisted Pair already suggests field termination is authorized when pre-terminated cable is not practical or feasible. Section 4.4.5 was updated to address situations where pre-terminated fiber optic cable is not feasible.	Revisit text to authorize field terminations where pre-terminated is not practical or feasible. Reference additional language discussing UTP from 4.4.1 and table 27 and says that the same logic needs to be applied to the fiber backbone sections.
88	4.4.4	4.4.5	4.4.5 was rewritten for clarification.	Replace A/B polarity with universal cassettes preference. Text in 4.4.4, Implementation Guidance 2nd paragraph, still requires revision. Two topics appear to be conflated; suggest separation and rewrite of the second portion of the paragraph.
89	4.4.4	4.4.5	Table 34 has been updated to reflect "MPO or LC (application dependent)" in the media connector field.	Review connector language: we don't specify LC connectors or MPO in 4.4.4 Fiber Optic Cable; only MPO. We do however, in 4.4.5 Fiber Distribution Cassettes
90	4.4.5	4.4.6	Added to evaluation factors in section 4.4.6 "Channel installations (including cassette equipment on each end) certified to Tier I and Tier II performance standards"	We want to ensure that fiber installations are tested per the white paper requirements; testing type is not called out elsewhere in the standard. This is located in the distribution cassette section as we are looking for permanent channel installations, where the appropriate place to test is with fiber terminated to the cassettes on each end already in place.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
91	Sec 4.4.4, Implementation Guidance	5.3.2	The text "See the O&M Standard for Telecommunications Infrastructure (publication pending) on cable routing and implementation." has been removed. The cable management Section 5.3.2 Management of Telecommunication Cabling that originated in the old O&M Standard remains in place.	"See the O&M Standard for Telecommunications Infrastructure (publication pending) on cable routing and implementation." is unenforceable by CO/CORs until published. How will the published document be integrated (supplemental standard alert or other method of delivery).
92	5.2.3	5.3.4	Created new section 5.2.3 Physical Access to Telecommunications Spaces. Wording was chosen to suggest separate telecommunications spaces to support individual functions are unnecessary and wasteful of limited resources. Administrative solutions to physical access to VA telecommunications spaces for all user groups with valid technical reasons to routinely access the spaces (e.g., OIT, FMS, biomed, R&D, police, custodial staff, etc.) are required to support mission requirements.	Multiple parties (OIT, FMS, biomed, R&D, police, custodial) require recurring, non-escorted access to telecommunications spaces.
93	NA	5.3.5	Section 5.3.5 Custodial Services created.	Require (w/o going into detail) custodial services for telecom spaces be provided, specifically with requirements for the services provided for the flooring to maintain the anti-static coating and/or qualities of the surface.
94	Table 9, Flooring	5.3.5, Table 7	Wording has been changed from "Anti-static" to "Static Dissipative" in table 9 and section 5.3.5.	"Anti-static" should be changed to "Static Dissipative."
95	Appx A	Appx A	The variance request form updated to help users better define the environment and need for a variance from the standards.	Variance requests are too vague and do not give a modicum of info needed to understand the requirements or make a proper adjudication. We should expand the request form to prompt for the required info at submission. Develop questions for the most frequent TEAM variances, such as TR size requests.

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96	Appx A, A-5, Coordination Instructions, Item 6	Appx A	Change to "DCIE or EHRM will approve, deny, or ask for clarification from their respective mailboxes. Allow a minimum of two weeks for processing."	Item 6: EHRM project provide approval, denial or request for clarification through the SI Tool for tracking. Non-EHRM project replies continue to be processed via the DCIE mailbox.
97	Appx B pg 228 Electrical One-Line (Ideal)	Appx B	The ideal electrical one line has been edited to illustrate the TR being fed from the normal and the critical branches.	TR is fed from normal and equipment branch on the one line. PG18-10 Elec Design Manual 4.6.1.2 has TR racks as part of the critical branch. PG18-10 Elec Design Manual 4.6.1.2
98	NA	Appx B	Antenna headend equipment room has been added to Appx B.	Need a design for a standard headend room that provides TR-equivalent connectivity as well as provides space and bonding for the special TDM systems that may be installed here. Discuss penetrations for antenna, power, and grounding access. Develop paragraph describing this as a subset of the TR with special requirements.
99	NA	Appx B	Sheets 28, 29, and 30 have been added to Annex B. These oneline diagrams show N+1 and 2N redundancy levels.	Consider adding visual example of the minimum upstream redundancy requirements for a one-line to supplement table 5, item 2, distribution paths.
100	Appx B	Appx B	<p>Reorganized Appx B Design Templates into sections to assist with navigation to specific topics; Telecommunications Spaces (Architectural), Telecommunications Enclosure (TE), Electrical Distribution and Bonding, Telecommunications Distribution (Elevations, Cabling, and Routing), and Basis of Design Equipment.</p> <ul style="list-style-type: none"> <li>• Added sheets for TEs, antenna entrance rooms, Power Distribution Unit (PDU), Uninterruptible Power Supply (UPS), temperature and humidity sensors, horizontal distance study (Diamond Analysis), electrical one-line drawings, cable routing, telecommunications spaces rack elevations, and the rule of thirds.</li> <li>• Added new switch models to the bonding</li> </ul>	General additions and changes to Appx B



Final ID	Reference	Final Ref	Change(s)	Reason for Change
			<p>page, clearances around racks and power panels, and separated out the fiber from the copper media into individual sheets.</p> <ul style="list-style-type: none"> <li>• Changed the light fixtures from 2' to 4' and replaced the 40" Chatsworth Network Cabinet with the Great Lakes Cabinet, and the Chatsworth Terraframe with the ZetaFrame replacement model.</li> </ul>	
101	Appx B	Appx B	<p>Electrical Panels have been relocated to corners. Notes have been added to Appx B stating "30" wide by 36" front clearance required around electrical panel boards."</p>	<p>Moving the shown locations of electrical panels to the corners of the rooms to clarify 36" clearance for NFPA. The template gives 36" inches around the racks, but that won't work unless panels are flush-mounted and the space is actually provided with the full clearance (which does not seem to frequently happen). Note that the 3' clearance requirements (NEC 110.26) for typical electrical panels which may be found in our telecom spaces do not apply to communications circuits (NEC Chap 8, Article 90.3).  <a href="https://www.mikeholt.com/instructor2/img/product/pdf/11NEC101-1076-sample.pdf">https://www.mikeholt.com/instructor2/img/product/pdf/11NEC101-1076-sample.pdf</a></p>
102	Appx B	Appx B	<p>Created the Fiber Media Details sheet in Appx B.</p>	<p>Add the OM4/OS2 12-fiber splice cassettes fitting the suggested fiber cabinets to the drawings; these are already described in the Div 27 specifications.</p>

Final ID	Reference	Final Ref	Change(s)	Reason for Change
103	Annex B	Appx B	Specification sheet in Annex B has been updated to reflect the scope of the requirement. "A-Side Blue/B-Side Yellow for dual path distro within computer rooms (data centers); UTP distro to WAOs is excluded.	EHRM Source A and Source B Patch Panel Color Coding: The info on Sheet 3 doesn't distinguish between DC's and TR's, or indicate that the scheme is for use only in places which *have* dual path copper distribution. Ron was interpreting that color coding as a *requirement* to use dual path copper everywhere, *including* to WAO's, and had trouble figuring out how to do that. Elsewhere, ISTS states that we have no recommended cabling color scheme, but the UTP cable jacket color is specified as Blue. For example, see Table 27, Table 29, and Sec 5.1.4.1. Some explanatory notes or a summary table explaining the conditions where cable and/or outlet colors are applicable and where they are not might be helpful.
104	Appx B	Appx B	Busway description removed from zone distribution sheet.	Sheet 18 Block 4 references busway distro on zone distro page with text that is identical to Sheet 17, Block 1 which correctly describes busways.
105	Appx B	Appx B	Added note on Appx B the TR sheet: a minimum of five metric designator 103 (trade size 4) conduits or sleeves should be provided to service up to 40,000 sq ft of usable floor space. one additional conduit or sleeve should be provided for each additional 40,000 sq ft of usable floor space.	Add 4" conduit requirement. Five 4" conduits/sleeves per 40,000 sq ft of usable floor space. Add one 4" conduit/sleeve for each additional 40,000 sq ft.
106	Appx B	Appx B	Added the following statement in B.1 "The use of these templated layouts and outfitting plans is required for VA telecommunications space design, construction, and modernization efforts." In B2 changed "utilize a medium design" to "Most medical centers will require a 'small' design to support their IT requirements." We also added the following into section 1.3 "impacting telecommunications distribution, space allocation, layout, electrical distribution, or mechanical systems "	All projects (limit this) need to be reviewed by DCIE, including us at early stages. A/Es and other project designers must follow templates, must design for ultimate design and take into consideration follow-on project requirements to meet VA's ultimate objectives (rather than simply the band aid needs of the current project), and must design systems to have holistically balanced capabilities. Strengthen language, and put it up front rather than just in App B.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
107	Appx B	Appx B	Added a cable riser diagram to the telecommunications distribution (elevations, cabling, and routing) section with diagrams for cabinets, HDA-MDA, multifloor, and ISP/OSP routing.	Develop a cable riser diagram for the generic small data center.
108	Appx B B.2	Appx B B.2	Added the following statement in B.1 "The use of these templated layouts and outfitting plans is required for VA telecommunications space design, construction, and modernization efforts." In B2 we changed "utilize a medium design" to "Most medical centers will require a 'small' design to support their IT requirements." We also added the following into section 1.3 "impacting telecommunications distribution, space allocation, layout, electrical distribution, or mechanical systems "	Appx B section B.2 provides superseded guidance on the use of generic medium data centers.
109	Sheet 19	Appx B, Sheets 19 & 21	Sheet 19 (60A ZPDUs) is correct. Sheet 18 plate 4, text indicates busway distro while the sheet is for 30A ZPDU distro. Changed text for clarity.	Examine text on sheets 17 and 18, plate 4 to confirm intent of statements.
110	xvi	Appx C.3	The term "blueprints" has been replaced with "design documents."	Change the word "blueprints" to "design documents". Blueprints are a deprecated term, no longer used within the industry. Design Documents are industry recognized terminology and consistent with terminology used in SOWs and contracts.
111	xxi	Appx C.4	NFPA 13, 75, and 99 are all added to the list of references.	Include NFPA 13. NFPA 13 is the baseline, NFPA 75 is the telecom specialization of 13, NFPA 99 is the healthcare specialization of 13
112	xxiii	Appx C.4	Added "VA DIRECTIVE 6008, Acquisition and Management Of VA Information Technology Assets" to the references section.	Include VA Directive 6008 Updated January 2023
113	Definitions	Definitions	The definition for demarcation point has been updated to " A physical location, typically in the entrance room, where the operational control or ownership of the incoming service	Incomplete Definition

Final ID	Reference	Final Ref	Change(s)	Reason for Change
			provider media changes from Service Provider to customer."	
114	Sec4.2.1.2 Figs 9, 10	Fig 9, 10	Figs 9 and 10 have been updated to represent Bus B on a generator backed power branch circuit.	UPS's in Fig 9 and 10 are shown connected to non-generator power. Topology shown in Fig 9 and 10 conflicts with text in 4.2.1.2 requiring rackmount UPS(s) to be connected to generator-backed power branch where available.
115	4.4.4	Multiple	Measurement references in the ISTS screened to follow industry standards. Kept commonly imperial measurements where typically used for doors, material ordering, etc. In those cases we also listed the imperial unit in parentheses. Format Ex: 1 M (3 FT).	Consider updateing measurements in both feet and meters to remain consistent throughout the document
116	xvii	Multiple	ANSI/TIA-568.5-2022 does not supersede any previous standard but builds upon and augments the TIA 568 series of standards. 568 references have been updated and are current.	All references to TIA 568-C.2; revise to TIA 568.2-D. TIA updated the replacement in 2018. <a href="https://www.cablinginstall.com/standards/article/16482213/drilling-down-on-the-ansitia5682d-cabling-standard">https://www.cablinginstall.com/standards/article/16482213/drilling-down-on-the-ansitia5682d-cabling-standard</a> .
117	Appx	Multiple	Moved the large appendices to the back.	Recommend moving the large appendices to the back.
118	Multiple	Multiple	All references to ANSI/TIA-607-C have been updated to ANSI/TIA-607-D.	Correct references from 607-C to 607-D throughout documents.
119	Multiple	Multiple	Section 4.4.1, UTP, Table 31 added the secondary attribute "Cable Length" to Table 31 and added the specification. In Table 30 we changed Multimode Termination Method specs to "Factory pre-terminated (computer room structured cabling use) Field terminated (connections between telecommunications spaces)". In the Single Mode Termination Method specs we changed the wording to "Field terminated (connections between telecommunications spaces)". Multimode Media Connector changes to "MPO or LC (application dependent)". Single Mode Media	Cable length is not to exceed 1m of excess length on each end. Complete path must be known so that all vertical and horizontal distances can be captured to obtain cables of the correct length. This should only apply in structured cable systems inside the MCR as field terminations are expected in inter-space connections. Field termination needs to be identified as the expectation for cable use between telecom spaces, and pre-termination as the expectation for structured cabling systems within the computer room.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
			Connector changes to "MPO or LC (application dependent)". In each MM/SM, we added the secondary attribute "Cable Length".	
120	References	References	Added "ANSI/TIA-568.5-2022, Balanced Single Twisted-pair Telecommunications Cabling and Components Standard" to the list of references.	New reference.
121	Sec4.1.1, Table 9, ID 1	Table 7	Wording has been changed from "If mullion is used, it must be removable." to "If center mullion is used, it must be removable."	Suggest revising door width from "If mullion is used, it must be removable." to "If center mullion is used, it must be removable."
122	Sec4.1.1, Table 9, ID 1	Table 7	Wording has been changed from "NSC- 3 ft" to "NSC- 3 ft (nominal)."	Suggest revising door width from "NSC- 3 ft" to "NSC- 3 ft (nominal)". Clarity. Single doors are measured based on the frame width, not including the door stop.
123	Table 9	Table 7	Replaced the language in Table 7 from "Door Height (Computer Room)" to "Door Height (Telecommunications spaces)."	Table 8, section 4.1.1 calls out a door height of 8' for "computer rooms" but does not say anything about the NSC subset spaces TRs and ERs. To disambiguate, recommend changing language.
124	Table 14	Table 11	Replaced "NSCs and other small IT spaces" with "Telecommunications Enclosures (TEs)" in Table 11.	We don't want line-interactive UPS systems proliferating. These are 1920VA and 2880VA systems that we see in legacy spaces today. All UPSs including 5kW rackmount are double conversion; only in the limited TE usage should we see the line interactive variety.
125	Table 14	Table 11	Added a new secondary attribute "Modularity" to the table.	We want to drive designs away from larger static UPS and towards modular frames, for both cost and efficiency reasons.
126	Sec4.2.6, Table 17, ID 1	Table 15	Added "Connectivity" "Network interface card required for connection and monitoring by the BAS and set for alarming on certain battery conditions"	Add secondary characteristic - NIC card. Consistency with Sec 4.2.2.2

Final ID	Reference	Final Ref	Change(s)	Reason for Change
127	Table 17	Table 15	Changed to, "Sufficient capacity to provide minimum 10 min runtime at current full loading levels."	Battery Capacity is specified in Time, not Energy (Watt-Hours). This is more appropriately a "Battery Runtime" specification, not a "Battery Capacity" specification. The abbreviation "min" is ambiguous in this context, and can be read as "minutes" or "minimum." If "Capacity" is retained, rephrase specification to read "Sufficient Watt-Hours to provide minimum 10 minutes runtime at full load."
128	Table 15	Table 16, 17	Table 15 was split into two separate tables to separate vertical rPDUs (Table 16) and IT equipment power cords (Table 17).	Update Table 15, ID 2, currently limited to C13/14 and C19/20. A C15 can be inserted into a C16 inlet, C14 inlet or a type E connector. However, the C13 can not fit into the C16 on the Cisco devices.
129	Table 28	Table 23	Added to Table 28 "(in healthcare facilities, the more restrictive requirements of the HVAC Design Manual must be met)"	Consider modifications to TR environmentals per design alert coming from HEFP to limit the allowable ranges, at least for healthcare environments or in VHA spaces. Consider that outlier use cases may still exist and that we consider ASHRAE's broader ranges to be acceptable. Perhaps change (narrow) the environmentals while still showing ASHRAE allowables, or add caveats and defer to the HVAC DM. Goal is to put TRs on AHUs which *should* be 24/7 even in leased facilities, which doesn't mesh fully with our requirement for dedicated cooling based on use cases where the building air does not operate 24/7.
130	Table 30	Table 28	Spelled out reference has been moved to first instance of acronym.	Define RM, RT, etc. in this section to avoid reader confusion. These acronyms were spelled out first in previous versions but text was added above.
131	Sec 4.2.2.2, Bullet 8	Table 28	Added "Infrastructure device communication modules shall support at least one of the following TRM approved protocols:"	For SNMP, include link to version approval (RFC 3414) in TRM to ensure monitoring software compliance. Simple Network Management Protocol (SNMP) (va.gov)
132	Table 30	Table 28	Table 28 secondary attribute has been changed to "Fire Protection" and the specification has been changed to "• VA telecommunications space fire protection systems shall be as required by the VA Fire Protection Design Manual Where allowed by	VA telecommunications spaces shall have fire protection and smoke detection systems as required by NFPA standards, local fire codes, the AHJ, and/or CFM requirements.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
			the AHJ, fire protection for CSCs and CDCs shall use an early-warning Aspirated Smoke Detection (ASD) system such as Very Early Smoke Detection Apparatus (VESDA)"	
133	Table 37	Table 37	Edited Table 37 to include Fiber Raceways and Ladder Racks. The following statement was also added in the implementation guidance in Section 4.4.9.1 "Cable tray in MSC, CSC, and CDC facility classifications is intended to support UTP distribution only, with fiber optic distribution to be in fiber optic raceways."	Ladder rack should be used for vertical transport support, and cable tray for horizontal. We generally do not recommend ladder-type cable tray because of inherent capacity limitations. There are remedies for this in the form of vertical stanchions that attach to the side of the tray to create support for cable depth, but it is not a great solution. That said, ladder-type cable tray is a superior design for vertical transport.
134	Table 13	Table 43	Updated Table 43 UPS attribute to reflect a rack-mounted 2880 VA metered L5-30 input/output	Update to either L5-30 all the way through or to a UPS that has receptacles on it and no horizontal RPDUs. The L5-20 input/output model UPS does not exist.
135	Table 44	Table 47	Updated the specification for fiber patch cords.	Fiber patch cord labeling in table 44 require updates.
136	Table 44, Sec 5.1.5.6	Table 47	Patch cable format now matches other sections in table 47.	Patch cable labeling in table 44 and section 5.1.5.6 lack clarity.
137	Table 44	Table 47	MPTL specifications in Table 47 have been updated for cameras, WAPs, and other PoE equipment.	Section 5.1.5.4, table 44 needs additional convention data for patch cable labeling when MPTL is used for security cameras and WAPs. ID5 provides the UTP patch cable label designation as CCA[aann-ru.xx]/[aann-ru.xx]. The second designator should be [aann-CAM], [aann-WAP], [aann-RPDU.s(.x)]. For RPDUs, the .s is either A or B indicating the side, and the (.x) is either 1 or 2, only used for HD cabinets.
138	Table 45	Table 48	rPDU labeling specifications were added to table 48	Rack and rPDU labeling in table 45 missing.

Final ID	Reference	Final Ref	Change(s)	Reason for Change
139	Table 4, 5	Table 5, 6	<p>Added to both Tables 5 and 6, a secondary attribute of power source with the following specification:</p> <ul style="list-style-type: none"> <li>• "Each CRAC and its associated heat rejection equipment for that CRAC powered from the same source</li> <li>• Sets of heat rejection systems diversely powered (from differing sources)</li> <li>• Design power sources to provide maximum reasonable avoidance of single points of failure"</li> </ul>	Ensure that CRACs and associated heat rejection equipment are powered diversely. They cannot all be on the same DP (SPOF).
140	3.3	Table 8	In Table 8 removed the word "UPS" from the fourth primary attribute. The specifications for System Redundancy Components has been updated.	Change language from N to N for UPS, but A/B dual paths required.
141	Table 13	Table 8	Changed the bullet in Table 8 to read "Ensure 3 ft minimum clearance from the front, back, and one side of each rack row to walls. The fourth side must not abut a wall and needs to leave 12 in. clearance "	Front and back clearances rules for 3' need clarification.
142	Sec4.1.2, Table 10, ID 2	Table 8	Wording has been changed from "engineered" to "manufacturer recommended."	Suggest replacing "Engineered floor stands..." with "Manufacturer recommended floor stands..." Reduces potential warranty issues and puts onus back on the equipment provider.
143	Table 10 Hot Aisle	Table 8	Wording has been changed from "Power cords if run in an access floor (without data cabling) will be placed in the hot aisle." to "Power cords if run in an access floor (where data cabling is run overhead) will be placed in the hot aisle."	Recommend changing language for clarity "Power cords if run in an access floor (where data cabling is run overhead) will be placed in the hot aisle.
144	Sec4.1.3, Table 12	Table 9, 10	TE requirements added to table 10 (non clinical spaces) and removed TE reference from Table 9 (clinical spaces).	Suggest adding the <96 WAO attribute for TEs to be consistent with Table 11 since the table is applicable to non-clinical space. Also ref Sec4.1.4 in tables 11 and 12.