

State of Michigan Technical Standard

1345.00.01 NETWORK AND TELECOMMUNICATIONS LOCAL AREA NETWORK (LAN) CABLING STANDARD

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PURPOSE

To establish a statewide standard for Local Area Network (LAN) cabling within State of Michigan (SOM) government agencies in a consistent manner as well as to comply with Public Act 431 of 1984, as amended.

In cases where an agency requests a variation to this standard for LAN cabling at a specific SOM network site, the Exception Request section below outlines the process.

CONTACT/OWNER

Department of Technology, Management and Budget (DTMB)
Office of the Chief Technology Officer (OCTO)
Network Services (NS)

SCOPE

Applicable to all SOM information technology systems that require DTMB NS Local Area Network (LAN) cabling.

STANDARD

DTMB NS or its appointed designee shall provide installation services to SOM Executive Branch Agencies for information transport cable within their areas. All such LAN cabling shall identify and define the following:

- A listing of the most common applicable Standards and Codes bodies.
- A partial listing of standards, codes, and best practices for management of information transport systems (ITS) media relating to LAN cabling.

APPLICABLE CODES AND STANDARDS

A partial list of the most common applicable Codes and Standards bodies follows:

1. [National Electrical Code \(NEC\)](#)

2. National Fire Protection Association (NFPA)
3. Underwriters Laboratory (UL)
4. [American National Standards Institute \(ANSI\)](#)
5. [Electronic Industries Alliance \(EIA\)](#)
6. [Telecommunication Industry Association \(TIA\)](#)
7. [Building Industry Consulting Services International \(BICSI\)](#)

REQUIREMENTS

Information provided herein is a basic guide for the installation of LAN information transport system cable. This guide provides general information as to the type of cable and terminating hardware to be used in SOM buildings. It is the responsibility of DTMB NS or its assigned designee for installation services to apply for and obtain all applicable permits as well as meet or exceed all applicable standards and codes.

LAN ITS CABLE

1. The information transport system will adhere, but not be limited, to NEC, NFPA, ANSI/EIA/TIA and BICSI code and standards.
2. Required permits will be on site as work commences.
3. The horizontal cabling system will adhere to, but not be limited to, the EIA/TIA 568 Standard and BICSI Standards. The data cable will be rated CAT5e or above. New building construction data cable will be rated CAT6A, in compliance with the performance thresholds specified below in Appendix #1.
4. LAN cable in the main telecommunication room (MTR) or telephone room (TR) will be terminated on an RJ45 jack or patch panel. This jack or patch panel will be rated with a bandwidth at least the same or higher than the attached cable.
5. LAN cable will be terminated on an RJ45 jack at the distributed end (work area). This jack will be rated with a bandwidth at least the same or higher than the cable from the MTR/TR.
6. Patch panels will be wall or rack mounted.
7. Plenum cable will be installed in all plenum areas. Non-plenum areas do not require plenum cable.
8. Wall fields and equipment racks will contain cable management systems (CMS).
9. All LAN cable termination points will be properly labeled with unique drop numbers per floor, at both cable ends, in accordance with ANSI/TIA/EIA-606-B standards.
10. Installed cable channels and links must be tested end-to-end and pass standard category performance tests in accordance with the ANSI/TIA/EIA 568 standard for each component. Test results must be retained by the installer for the length of the contract and provided to DTMB upon request and prior to the contract expiration.

11. All OSI Layer 1 (physical layer) components of the channels must be made by the same component/cable manufacturer (hereafter referred to as “the Manufacturer”).
12. The Manufacturer must offer an extended warranty of 25 years to include parts and labor.
13. The Manufacturer must offer guaranteed channel performance for Cat 6 and Cat 6A solutions. Component compliancy alone is not acceptable.

Note: Documentation of the ANSI/TIA/EIA, BICSI, NEC and NFPA standards referenced in this document can be purchased from the responsible organization:

- [BICSI](#)
- [TIA](#)
- [ANSI](#)
- [EIA](#) standards are now managed by the Electronic Components Industry Association.
- ‘NEC’ the National Electrical Code is a trademark of the [National Fire Protection Association](#).

EXCEPTION REQUEST

This section describes a process whereby a SOM agency may request a variation to this standard for a particular circumstance.

Note that network infrastructure projects and change requests are submitted by Agencies following the [DTMB-0184 Infrastructure Services Request](#) (ISR) process.

DTMB may allow a variation from this standard for a specified location and reason. Approval for such a variation must be arranged through the DTMB Agency Services Business Relationship Manager (BRM) for the Agency sponsoring the ISR prior to any installation work that utilizes the variation.

To request variations from this standard:

1. The DTMB Agency Services BRM will contact the DTMB Network Services Project Coordinator identified in the ISR process to request a review of the variation submitted by the contracted cable installer.
2. The Network Services Project Coordinator will bring the variation request forward to the DTMB Network Services Manager and their team members assigned to the ISR within 10 business days.
3. Network Services will review the request. The review process may include discussions with the contracted installer, visits to the location, and/or negotiated modifications of the original variation request.
4. Network Services will respond with their determination if the variation is acceptable for the specific ISR and location and include any provisions DTMB might require for acceptance.
5. The Network Services Project Coordinator will document the DTMB response for the variation request and provide the result to the Agency Services BRM.

6. The Agency Services BRM will inform the Agency point of contact for the project of the DTMB response within 10 business days.

If the Agency wishes to appeal the DTMB response to the variation request, they may ask the Agency Services BRM to submit an exception request following the [SOM 1305.00.02.01 Technical Review Board \(TRB\) and Executive Technical Review Board \(ETRB\) Exception Procedure.](#)

GLOSSARY

ANSI

American National Standards Institute – A private, nonprofit organization that functions as an administrator and coordinator of American voluntary standardization systems. Its membership includes private and public sector organizations.

BICSI

Building Industry Consulting Services International – Helps develop standards and guidelines for networking. Its certifications are de-facto standards for cable installers.

CAT 5e

Enhanced Category 5 – An unshielded twisted pair (UTP) cable that can support data speeds of 1000 Mbps, i.e., gigabit speed. Cables can reach a length of 100 meters.

CAT 6

Category 6 – A UTP cable that is backward compatible with CAT 5e has greater immunity from noise and crosstalk, and can handle data speeds of 10 Gigabits per second (Gbps, i.e. 10 GBase-T). It provides performance of up to 250 MHz.

CAT 6A

Category 6A, or Augmented Category 6. This has improved alien crosstalk characteristics, enabling 10 GBase-T to be run for a distance of 100 meters. It has doubled the bandwidth frequency from 250 MHz (CAT 6) to 500 MHz.

CBTC

Commercial Building Telecommunications Cabling – A subcommittee of the TIA (see below), tasked with revising the TIA's "Building Automation System Cabling Standard."

CMS

Cable Management System.

DMARC

Demarcation point – This is the physical point at which the public network of a telecommunications organization, such as a phone or cable company ends, and the private network of the customer begins. This is usually where the cable physically enters a building.

ECIA

Electronic Components Industry Association (see EIA below).

EIA

Electronics Industries Alliance – This organization ceased operations in February 2011. It assigned the maintenance of existing interconnect, passive electro-mechanical (IP&E) standards to the ECA, (Electronic Components Association), which in turn has joined the ECIA (Electronic Components Industry Association). From the ECIA's website as of 5/31/2013, "the EIA standards brand will continue for IP&E standards within ECIA."

ITS

Information Transport Systems – Systems and infrastructure that move information within a commercial building. That information can be audio, video, voice, data, electronic safety, and security, environmental, and building controls.

MTR

Main Telecommunication Room – The room, located in the center of a building, for the telephone (voice), data and video services (DMARC). The room may also serve as the Telecommunication Room (TR) of the floor on which it exists.

NEC

National Electrical Code – Set of standards for the safe installations of electrical wiring and equipment. It is not a legally binding regulation, but it is often used by states and municipalities. "NEC" and "National Electrical Code" are registered trademarks of the National Fire Protection Association (NFPA). The NEC has also been approved by ANSI as a national standard.

NFPA

National Fire Protection Association – The organization that sets standards for fire protection and safety, including requirements for protecting Plenum spaces; standards for plastics used in the construction of Plenum cables.

OSI Layer 1

The Open Systems Interconnection model (OSI model) is a conceptual model from the International Organization for Standardization (ISO) that "provides a common basis for the coordination of standards development for the purpose of systems interconnection."

The physical layer (Layer 1) is responsible for the physical cable or wireless connection between network nodes. It defines the connector, the electrical cable or wireless technology connecting the devices, and is responsible for transmission of the raw data, which is simply a series of 0s and 1s, while taking care of bit rate control.

Plenum Cable

The type of cable deployed in Plenum spaces. They are required by NFPA standards to be coated with fire-retardant cable so that in the event of a fire they do not release toxic gases.

Plenum Space

The space in a building used to circulate air for air-conditioning and heating. It is also commonly used to house the cables for the building's telephone and computer networks. The most common examples are the space between the structural ceiling and the suspended ceiling or the space under a raised floor.

TIA

Telecommunications Industry Association – Accredited by ANSI to develop standards for information and communication technologies.

TR

Telecommunications Room – The rooms stacked on each floor of a multi-floor building (except the MTR) to house information outlet terminations and cable terminations for the riser system.

UL

Underwriters Laboratories – This is a global independent safety science company offering expertise in certification, validation, testing, inspections, auditing, education, and advisory services.

APPROVING AUTHORITY

Michelle Lange, Director

Revised: 02/07/2025

APPENDIX #1 – LAN DATA CABLING ELECTRICAL SPECIFICATIONS

A. NEW BUILDING CONSTRUCTION DATA CABLING PERFORMANCE

New building construction data cable will be rated CAT 6A and additionally will meet the minimum cable technical performance requirements for signal loss and attenuation listed below in this Appendix.

Minimum Channel average PSANEXT loss	
PSANEXT: Power Sum alien near end crosstalk	
It is the summation of all radiated power from neighboring connectors, measured at the same end as the injected power.	
Frequency (MHZ)	6A Cable Guaranteed Performance
1.00	82.50 db
4.00	76.23 db
8.00	73.22 db
10.00	72.25 db
16.00	70.21 db
20.00	69.24 db
25.00	68.27 db
31.25	67.29 db
62.50	64.29 db
100.00	62.25 db
200.00	57.73 db
250.00	56.28 db
300.00	55.69 db
400.00	53.22 db
500.00	51.77 db

Minimum Channel PSAACRF	
PSAACRF: Power Sum attenuation to alien crosstalk ratio far end.	
It is the difference between the signal attenuation and the power sum alien far-end crosstalk measured in decibels.	
Frequency (MHZ)	6A Cable Guaranteed Performance
1.00	77.00 db
4.00	65.00 db
8.00	58.90 db
10.00	57.00 db
16.00	52.90 db
20.00	51.00 db
25.00	49.00 db
31.25	47.10 db
62.50	41.10 db
100.00	37.00 db
200.00	31.00 db
250.00	29.00 db
300.00	27.50 db
400.00	25.00 db
500.00	23.00 db

A. NEW BUILDING CONSTRUCTION DATA CABLING PERFORMANCE (CONTINUED)

Minimum Channel PSAACRF	
ACRF: Attenuation to alien crosstalk ratio far end.	
It is the difference between the signal attenuation and the far-end crosstalk measured in decibels.	
Frequency (MHZ)	6A Cable Guaranteed Performance
1.00	69.30db
4.00	57.20 db
8.00	51.20 db
10.00	49.30 db
16.00	45.20 db
20.00	43.20 db
25.00	41.30 db
31.25	39.30 db
62.50	33.30 db
100.00	29.30 db
200.00	23.20 db
250.00	21.30 db
300.00	19.70 db
400.00	17.20 db
500.00	15.30 db

Minimum Channel PSANEXT	
PSANEXT: Power Sum Alien Near End Crosstalk Loss.	
It is the loss on one pair caused by the sum of alien crosstalk from other cables measured at the same end of the cable as the transmitter.	
Frequency (MHZ)	6A Cable Guaranteed Performance
1.00	80.0 db
4.00	74.0 db
8.00	71.0 db
10.00	70.0 db
16.00	68.0 db
20.00	67.0 db
25.00	66.0 db
31.25	65.0 db
62.50	62.0 db
100.00	60.0 db
200.00	55.5 db
250.00	54.0 db
300.00	52.8 db
400.00	51.0 db
500.00	49.5 db