

Information Technology Systems Installation Methods Manual

Installation practices for the ICT profession

Eighth Edition



**Information Technology
Systems Installation
Methods**

M A N U A L

8th Edition



We welcome all comments about this manual. If you have any questions about BICSI and its services, please contact our office at 800.242.7405 (USA/Canada toll free); +1 813.979.1991; fax +1 813.971.4311; e-mail bicsi@bicsi.org; website www.bicsi.org.

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The contents of this manual are subject to revision without notice due to continued progress in information and communications technology (ICT) methodology, design, and manufacturing.

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Thank you for ordering the *Information Technology Systems Installation Methods Manual*, 8th edition. Please place the chapter tabs and appendix tabs in front of the title page for each chapter and appendix.

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This publication is not a single source document but a compendium of many sources of ICT-related practices, processes, and procedures.

The information contained in this publication includes, but is not limited to, national and international codes, de jure and de facto standards, and industry-accepted best practices terminology. All source information can be found in Appendix A: Codes, Standards, Regulations, and Organizations and the Bibliography section of this manual.

BICSI® recommended best practices are industry established best practices and not specifically developed by BICSI. When necessary, BICSI will select and recommend widely used and acceptable methods for the performance of a particular task or process based on numerous factors, including, but not limited to, widespread field acceptance, manufacturer's recommended methods, and safety.

WARNING

It is the responsibility of the user of this manual to determine the use of the applicable safety and health practices (e.g., in the United States, Occupational Safety and Health Administration [OSHA], *National Electrical Code*[®] [NEC[®]], *National Electrical Safety Code* [NEESC[®]]) associated with ICT installation practices. BICSI shall not be liable to the purchaser or any other entity with respect to any liability, loss, or damage caused directly or indirectly by application or use of this manual. No project is so important nor any completion deadline so critical to justify nonconformance to ICT industry standards. This publication does not address safety issues associated with its use. It is the ICT industry professional's responsibility to use established and appropriate safety and health practices and to determine the applicability of all regulatory issues.

New *ITSIMM* 8th Edition Significantly Updated!

Welcome to the 8th edition of BICSI's *Information Technology Systems Installation Methods Manual (ITSIMM)*! Thanks to the efforts of a dedicated team of volunteer subject matter experts and their team leaders from the Technical Information and Methods and the Registration and Credentials Supervision committees, and the BICSI Publications and Standards members, this new edition encompasses up-to-date information concerning materials, methodologies, and governing directives for ICT installation.

Highlights of this edition include:

- General updates to reflect current applicable codes, standards, and industry best practices.
- Updated optical fiber and copper cable media types to include current Category/Class designations for copper cable and OM/OS designations for optical fiber cable.
- Updated premise passive optical network (PON) and centralized optical fiber cabling information.
- Revised tables and information related to conduit fill requirements based on current codes.
- Updated information related to applications such as voice over Internet protocol (VoIP), unified communications, modular plug terminated link (MPTL) implementation, and information specific to data center installations.
- Updated information on safety considerations, additional information on personal protective equipment (PPE), typical safety hazards present on a work site, and safety planning procedures.
- Updated information related to installations involving utility columns and microduct.
- Updated information related to specialty system installation, such as building management systems (BMS), electronic safety and security systems (ESS), and wireless systems.
- Updated information concerning project management, including obtaining applicable information and documents prior to beginning an installation project, conducting site surveys, required project documentation, project meetings, and material handling and storage.
- Updated information concerning retrofits and upgrades, including current ICT technologies and applications, updated information and procedures for developing job plans and conducting site surveys based on industry best practices, additional information on requirements for coordination with other trades and disciplines, and updated information on cutover procedures.
- Updated Appendix information concerning project specifications per the current version of CSI *MasterFormat*[™] organization.

Whether you are just beginning your career in the ICT industry or are a seasoned veteran, we hope you will find this 8th edition of the *ITSIMM* a useful addition to your reference materials.

Sincerely:



Robert Gross
ITSIMM 8th edition TI&M Manual SMETL



Robert Hertling
TI&M Committee Vice Chair

Acknowledgments

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In Memoriam Bruce Nardone



From L to R: Ray Craig, Chuck Wilson, Bruce Nardone.

BICSI is dedicating this *ITSIMM* 8th edition to one of this manual’s greatest contributors, Bruce Nardone, who sadly passed away in March 2020. Bruce left a lasting impact on the many who knew him, and we wish to recognize his notable influence on the ICT industry.

Bruce was a staunch proponent of BICSI and was often referred to as “Mr. BICSI” at Southeast Regional Meetings. He was known for his dedication to safety and accuracy, strictly adhering to current codes and industry standards. He was always on the cutting edge of terminology, processes, and procedures, and transferred this knowledge into this manual. He was rightly awarded the BICSI Outstanding Member of the Year in 2018.

Bruce also served on several BICSI committees, including Codes, Standards, Membership Outreach and Development and contributed his knowledge to several *ITSIMM*, *TDMM* and *OSPDRM* revision teams. His favorite charity was BICSI Cares, and he never left a conference before seeing the BICSI Cares presentation.

Bruce lived a life dedicated to service. Before his many years in the ICT industry, he served in the U.S. Armed Forces for 18 years (four in the U.S. Marines [1973-1977] and 14 in the U.S. Army [1977-1991]). Much of his time in the Army was spent in Germany, his favorite duty station.

Upon retiring from the Army, Bruce settled in Clearwater, Florida where he began working in the ICT structured cabling industry. He established his career as a project manager and estimator for local Tampa Bay area ICT companies before becoming a BICSI Master Instructor and SME (2003-2005). Bruce’s love of training future ICT installers and technicians was apparent in all his interactions. He was later employed as a Spec Engineer for Leviton and a CPI Trainer for Panduit.

Bruce was a great friend, mentor, and industry leader. He will be missed.

About BICSI... Advancing Information and Communications Technology (ICT)

BICSI provides information, education, and knowledge assessment for individuals and companies in the ICT industry. We serve more than 26,000 ICT professionals, including designers, telecommunications project managers, installers, and technicians. These individuals provide the fundamental infrastructure and project management for telecommunications, audio/video, life safety, and automation systems. Through courses, conferences, publications, and professional registration programs, BICSI staff and volunteers assist ICT professionals in delivering critical products and services and offer opportunities for continual improvement and enhanced professional stature.

Headquartered in Tampa, Florida, USA, BICSI membership spans nearly 100 countries.

BICSI Vision Statement

BICSI will be the preeminent ICT resource for the Connected World.

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- In general, approximate (soft) conversions are used in this manual and are denoted with the approximate symbol (\approx) in front of the metric number. Approximate conversions are considered reasonable and practicable; they are not precise equivalents. In some instances, equivalents (hard conversions) may be used when it is a:
 - Manufacturer requirement for a product (e.g., conduit sizes).
 - Standard or code requirement.
 - Safety factor.
- In general, approximate SI units of measurement are converted to an imperial unit of measurement and placed in parentheses. Exception: When the reference material from which the value is pulled is provided in imperial units only, the imperial unit is the benchmark.
- For metric conversion guidelines, refer to IEEE/ASTM SI 10, *American National Standard for Metric Practice*.
- Trade size is approximated for both metric and non-metric purposes. Example:
 \approx 100 millimeters (mm [4 trade size]).
- In some instances (e.g., optical fiber media specifications), the physical dimensions and operating wavelengths are designated.