"What do DCDCs do? and how they relate to the ANSI/BICSI 002 standard?"

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Based on presentation from :
Jonathan Jew President, J&M Consultants, Inc
Rick Ciordia, PE, RCDD, DCDC, RTPM, CT BICSI Global Region Director
Gautier Humbert, RCDD, CDCDP.BICSI Mainland Europe District Chair

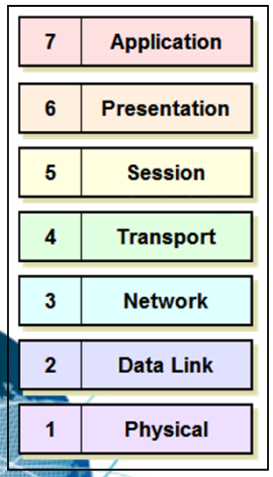
BICSI International Standards Program

- Develop standards within all facets of Information & Communications Technology (ICT) infrastructure design and installation
- Details:
  - Over 450 member worldwide
  - Accredited by ANSI
  - Develops international open to use/“royalty free” standards and best practices

BICSI Standards Within ICT

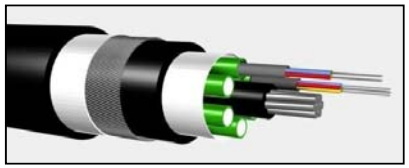
IEEE

Defines the message and transmission characteristics



ISO/IEC, CENELEC, ANSI/TIA

Defines the transmission media and system specifications

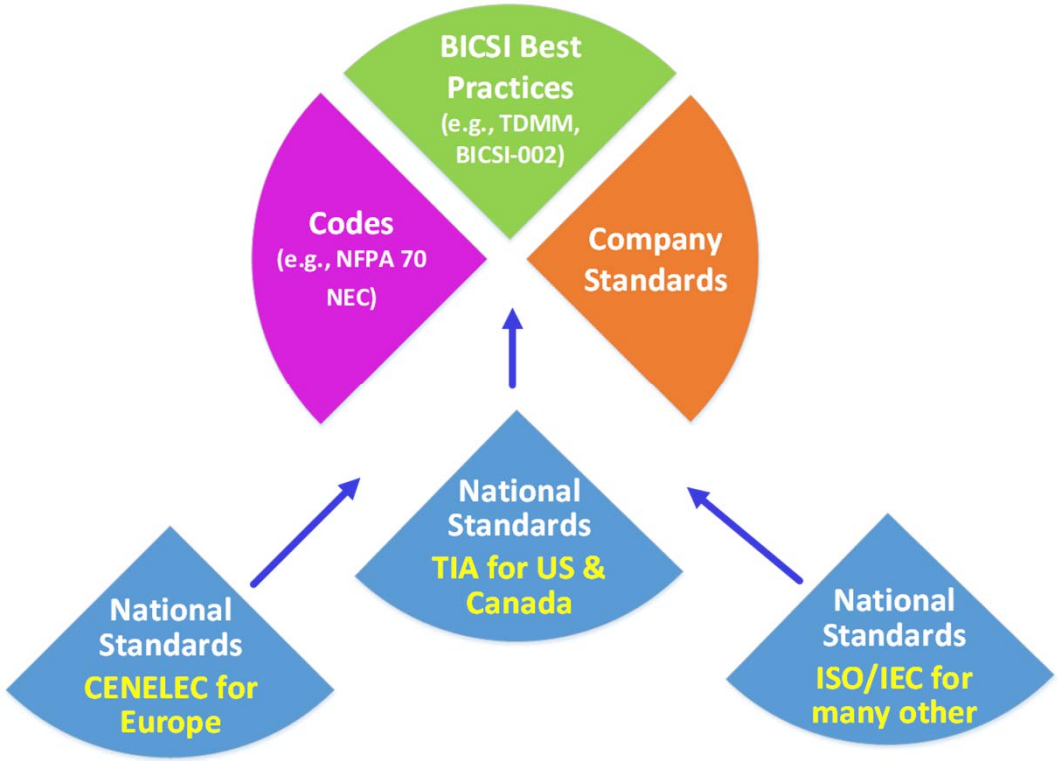


BICSI

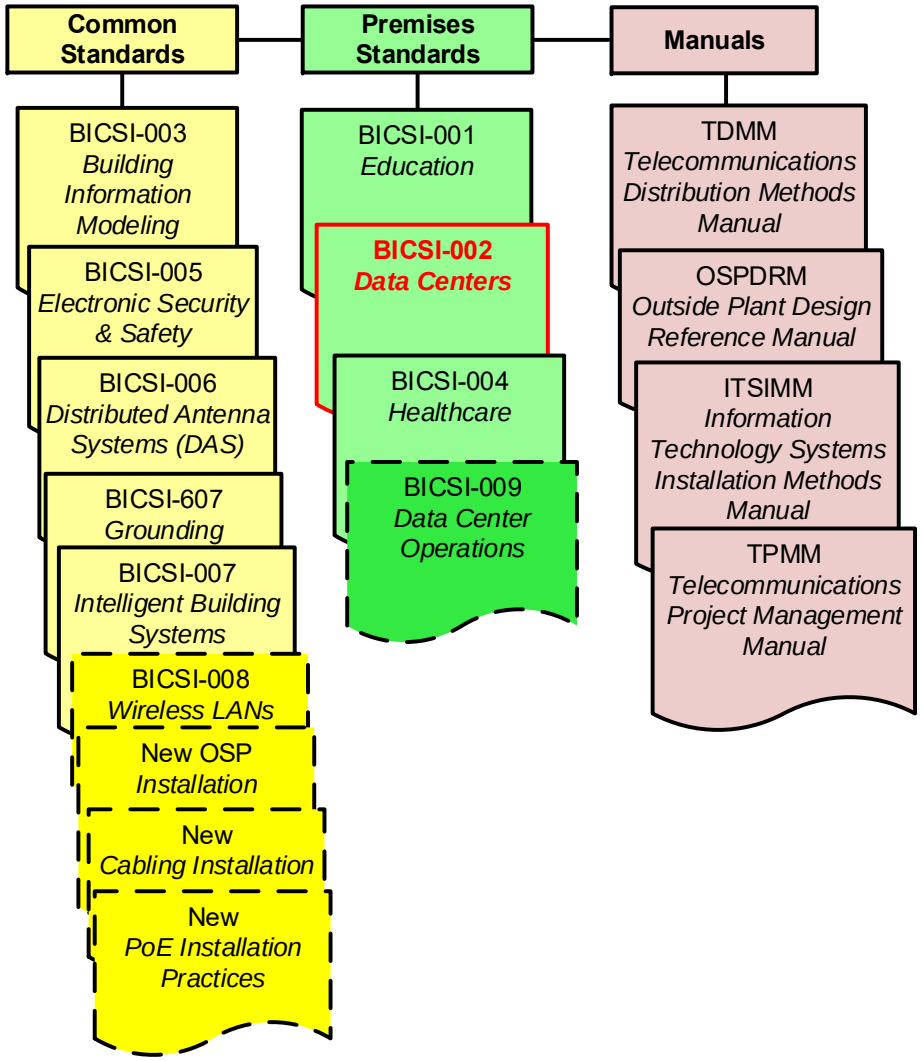
Defines how to design solutions using transmission media and systems

BICSI standards and manuals are also a family of complementary publications and are meant to work with TIA, CENELEC, ISO, & other national standards

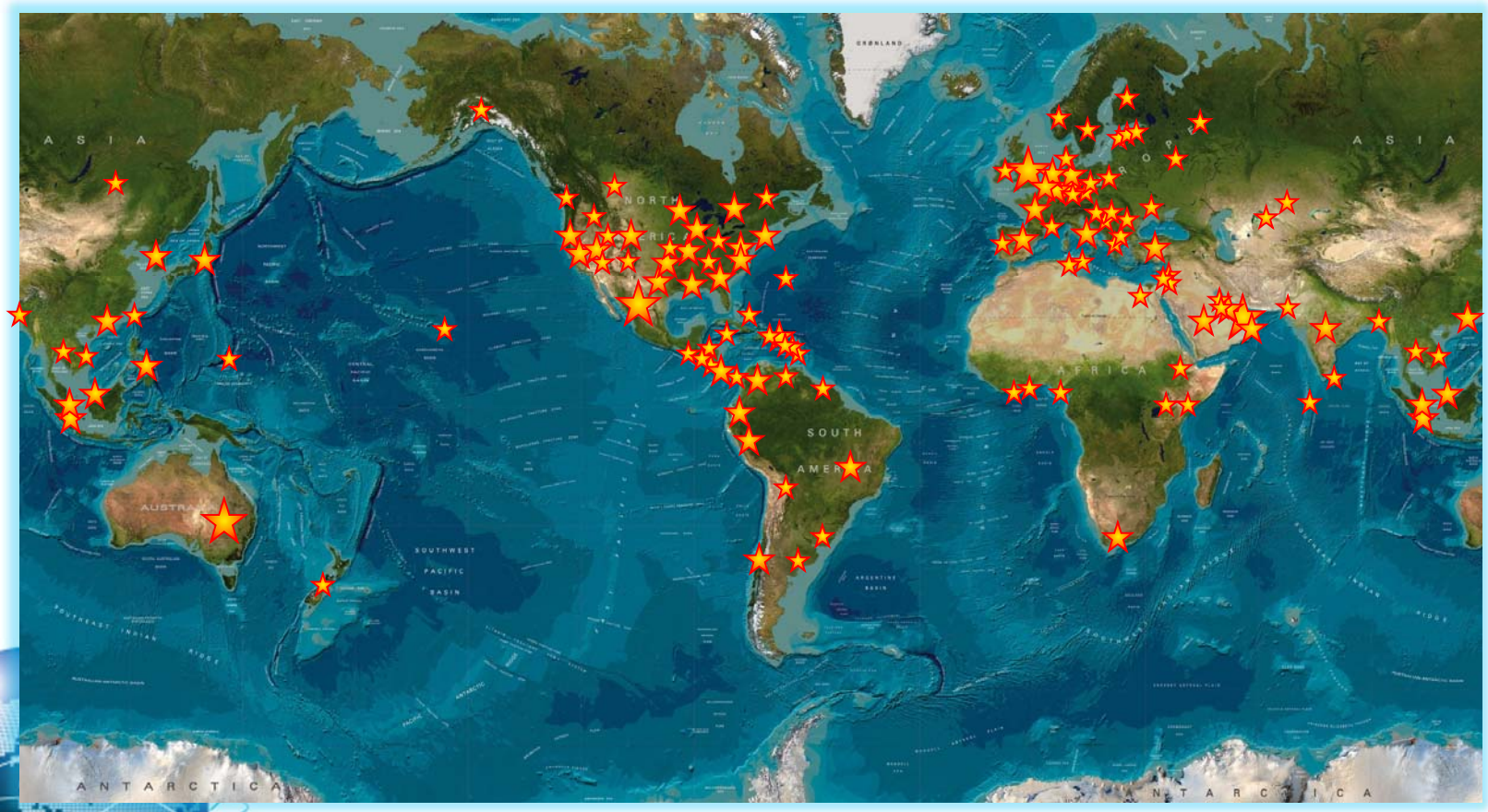
BICSI Publications Complement National Standards



BICSI-002 is part of a family of standards & manuals



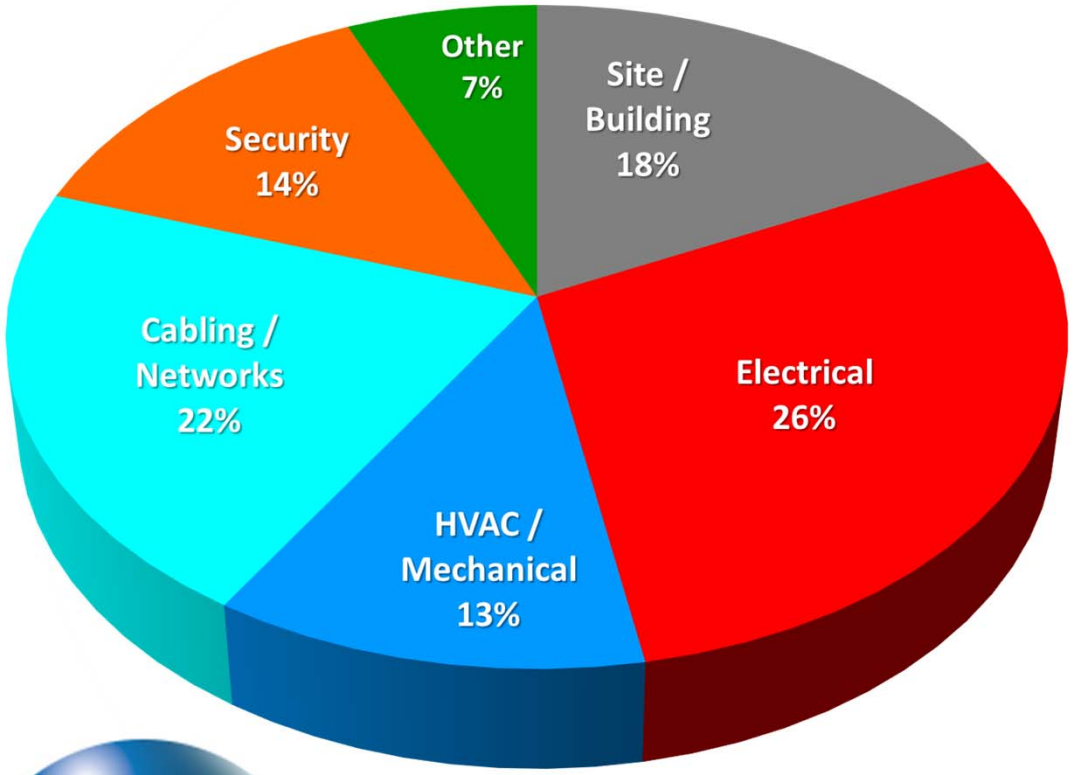
Reach of BICSI Standards

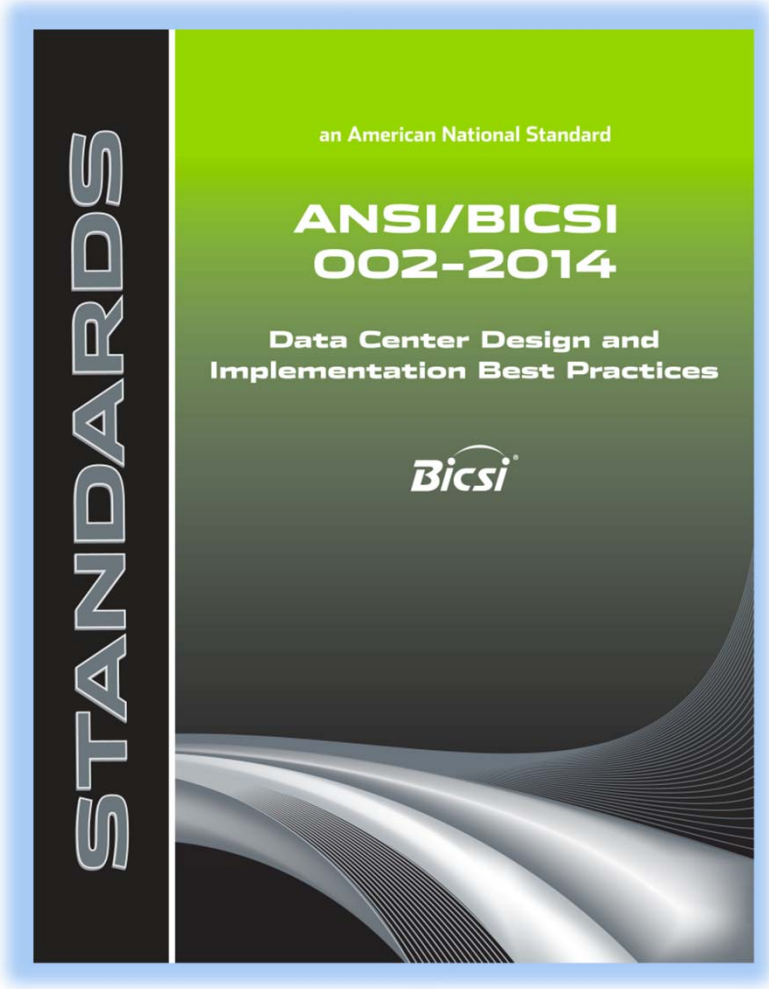


About ANSI
(American National Standards Institute)

- Promotes standards use within United States
- Accreditation body
  - Standards Development
  - Credentialing Bodies (ISO 17024)
  - Testing Laboratories (ISO 17025)
- Ensures open and unbiased standards development processes
- Does not create standards

BICSI 002-2014 Breakdown





Represents 408 pages of normative content across 13

Content Revision and Expansions

- Availability Classes
- Modular Data Centers*
- Hot/Cold Aisles
- Mechanical Systems*
- DCIM*
- Circuit Maps and DC Power
- Cabinet Airflow and Cabling Capacity
- “Green” / Efficiency*
- Building Structure
- Site Hazards
- Data Center Services Outsourcing Model*
- Bonding & Grounding
- Commissioning
- Network Security*
- Telecommunications Cabling
- *(And More …)*

** Indicates all new content to this edition*

BICSI

Data Center Standards

ISO/IEC 24764 (2010)
Information technology — Generic cabling systems for data centres
44 pages

CENELEC EN 50173-5:2007 / A2:2012
Information technology — Generic cabling systems - Part 5: Data centres
48 pages

CENELEC EN 50600 (2012-)
Information technology — Data centre facilities and infrastructures
Multiple Documents

ANSI/TIA-942-B (2017)
Telecommunications Infrastructure Standard for Data Centers
134 pages

ANSI/BICSI 002-2014
Data Center Design and Implementation Best Practices
534 pages

ASHRAE TC9.9 (2015)
Thermal Guidelines for Data Processing Environments, 4th edition
164 pages

BICSI

TIA-942 and BICSI-002

- BICSI-002 provides best practices that exceed the minimum requirements of TIA-942
- BICSI-002 provides information on a wide range of subjects not covered in TIA-942

BICSI

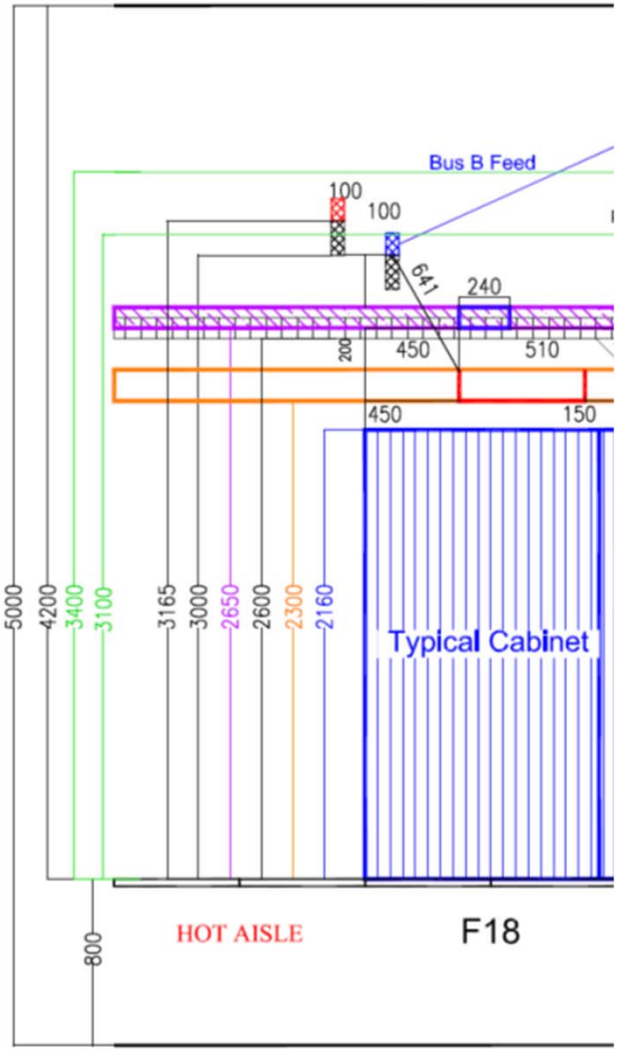
TIA-942 and BICSI-002

- TIA-942 provides requirements for the design of data center telecommunications infrastructure
- BICSI-002 provides a wide range of information, recommendations, and requirements regarding all aspects of designing a data center

BICSI

BICSI-002 Best Practices vs TIA-942 requirements

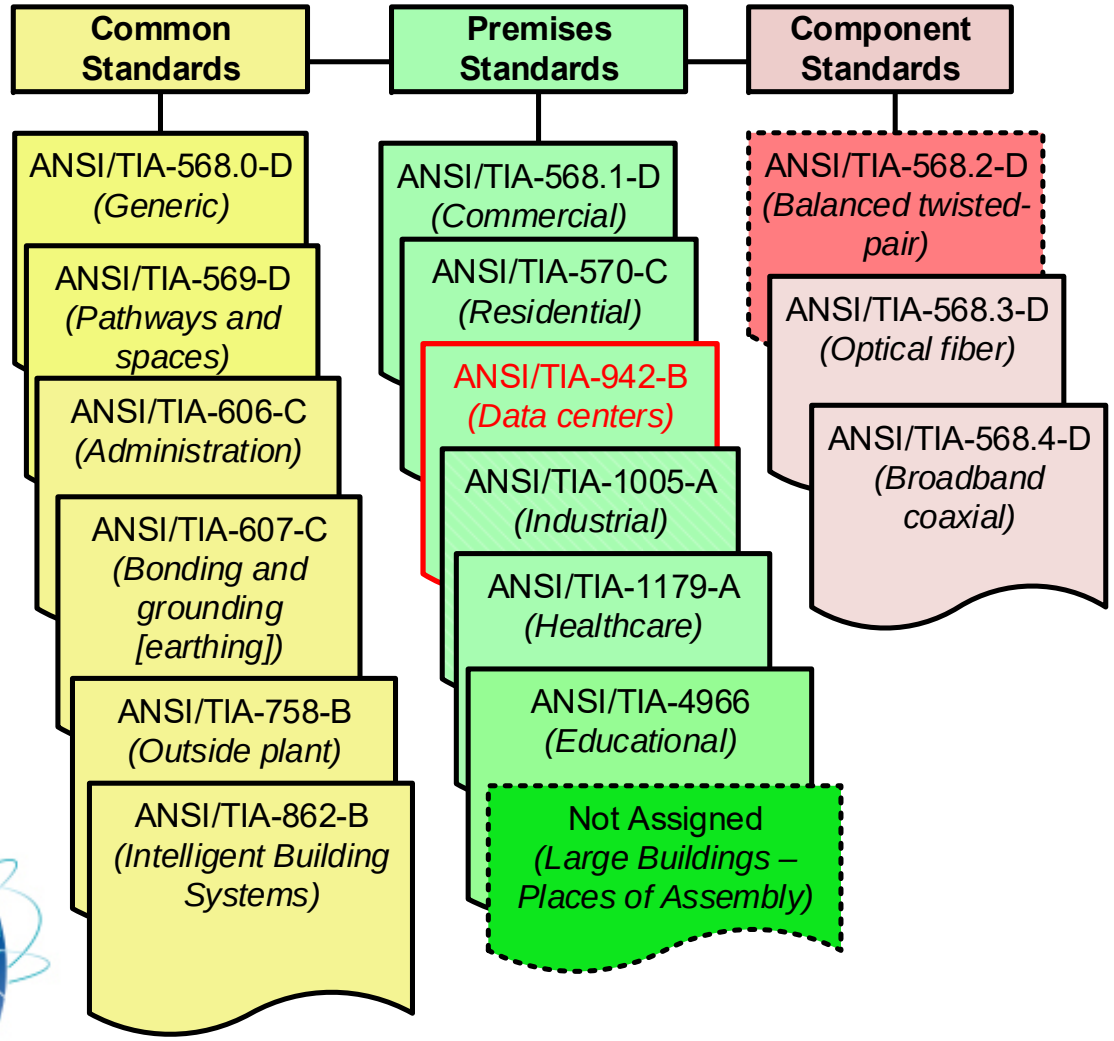
- Example: Ceiling heights
  - TIA-942
    - minimum height 2.6 m (8.5 ft)
  - BICSI-002
    - minimum height 3 m (10 ft)
    - Recommended height 4.5 m (15 ft) or greater



TIA standards apply in US and Canada and are widely used in other countries

BICSI

TIA-942 is part of a family of TR-42 cabling standards



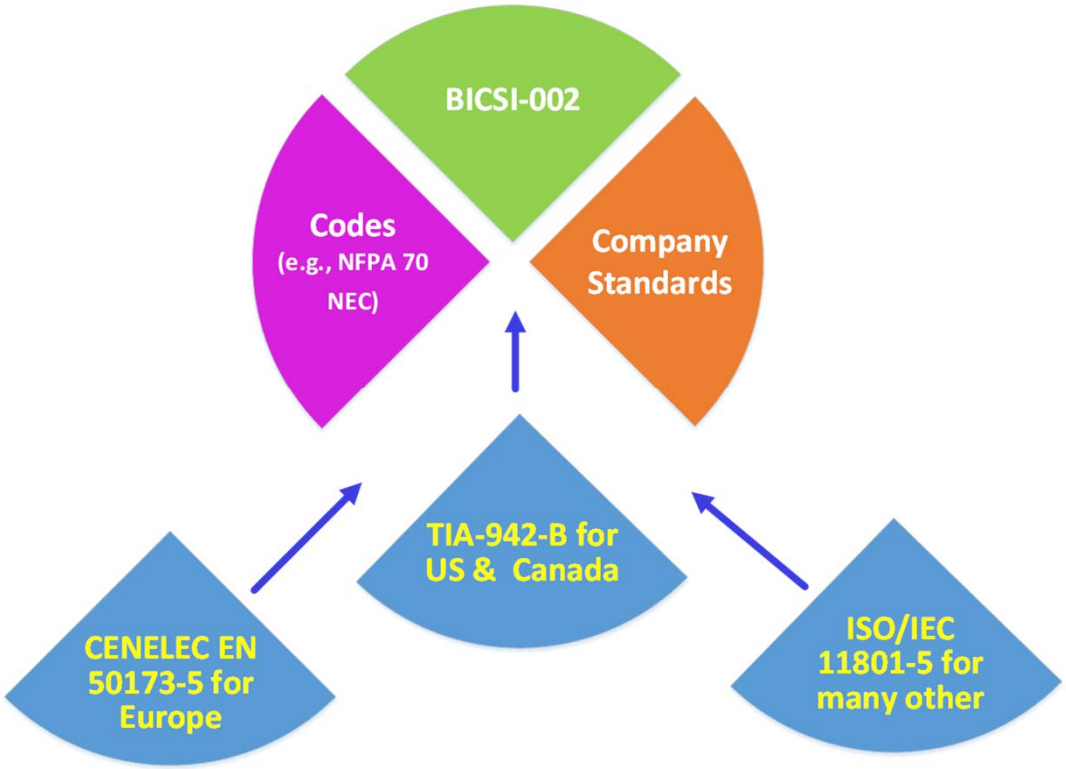
BICSI

BICSI-002 by design is intended to complement TIA-942 and other national data center standards, and is incomplete without them

Using BICSI-002 & TIA-942

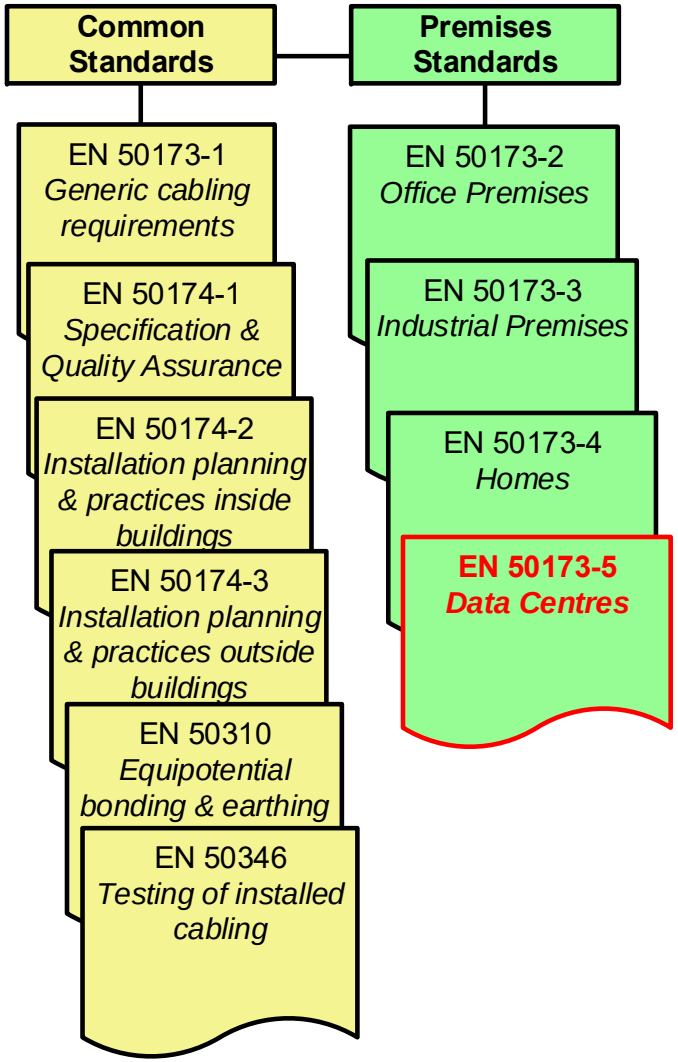
- Design of the telecommunications cabling infrastructure (cabling system, pathways, spaces) should use both TIA-942-B and BICSI-002-2014
- Use BICSI-002 to understand other aspects of the data center design and make informed decisions when specifying requirements and reviewing designs by other disciplines

BICSI-002 Complements TIA-942

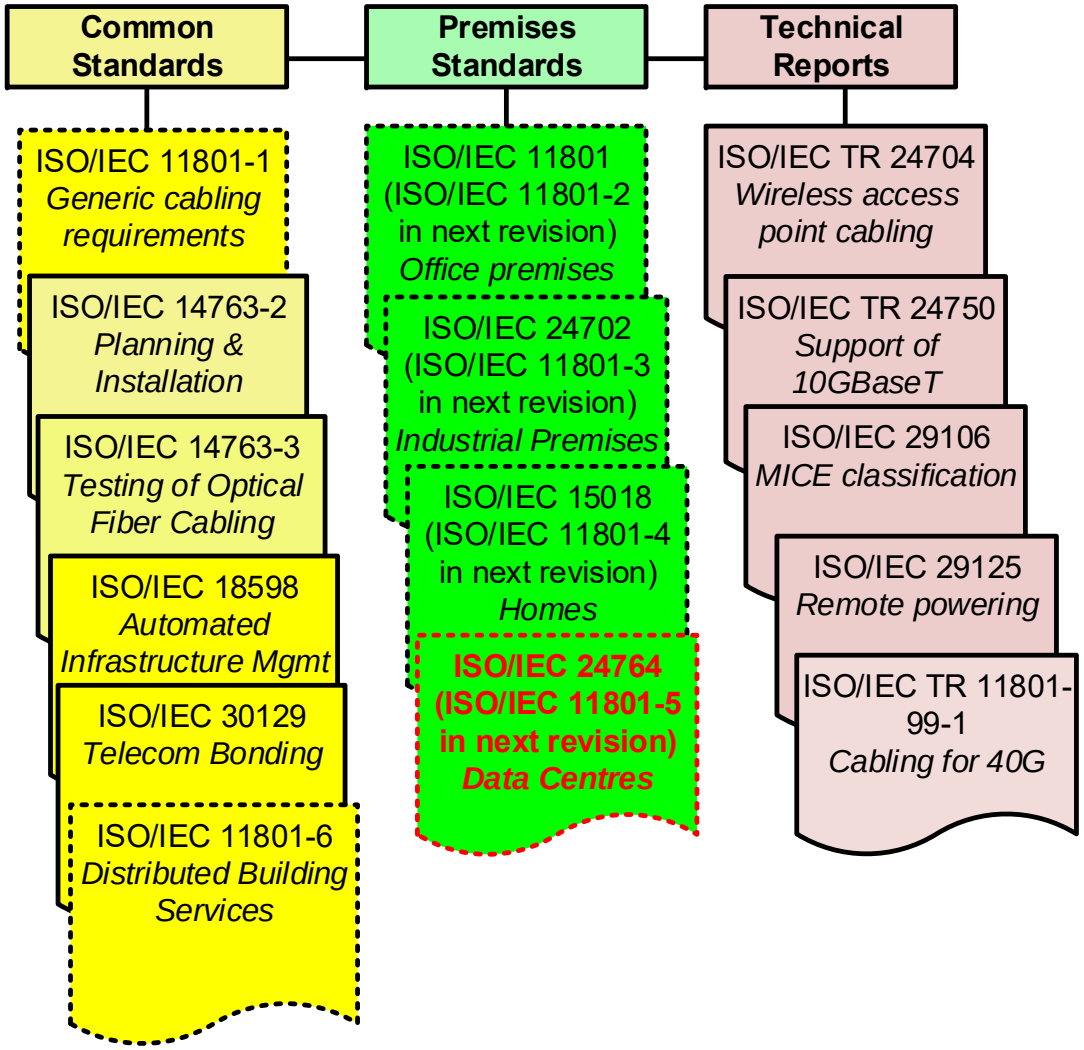


Other families of standards apply in other countries

European (CENELEC) premises cabling standards



International (ISO/IEC) premises cabling standards



BICSI Design Classes and Selection Methodology

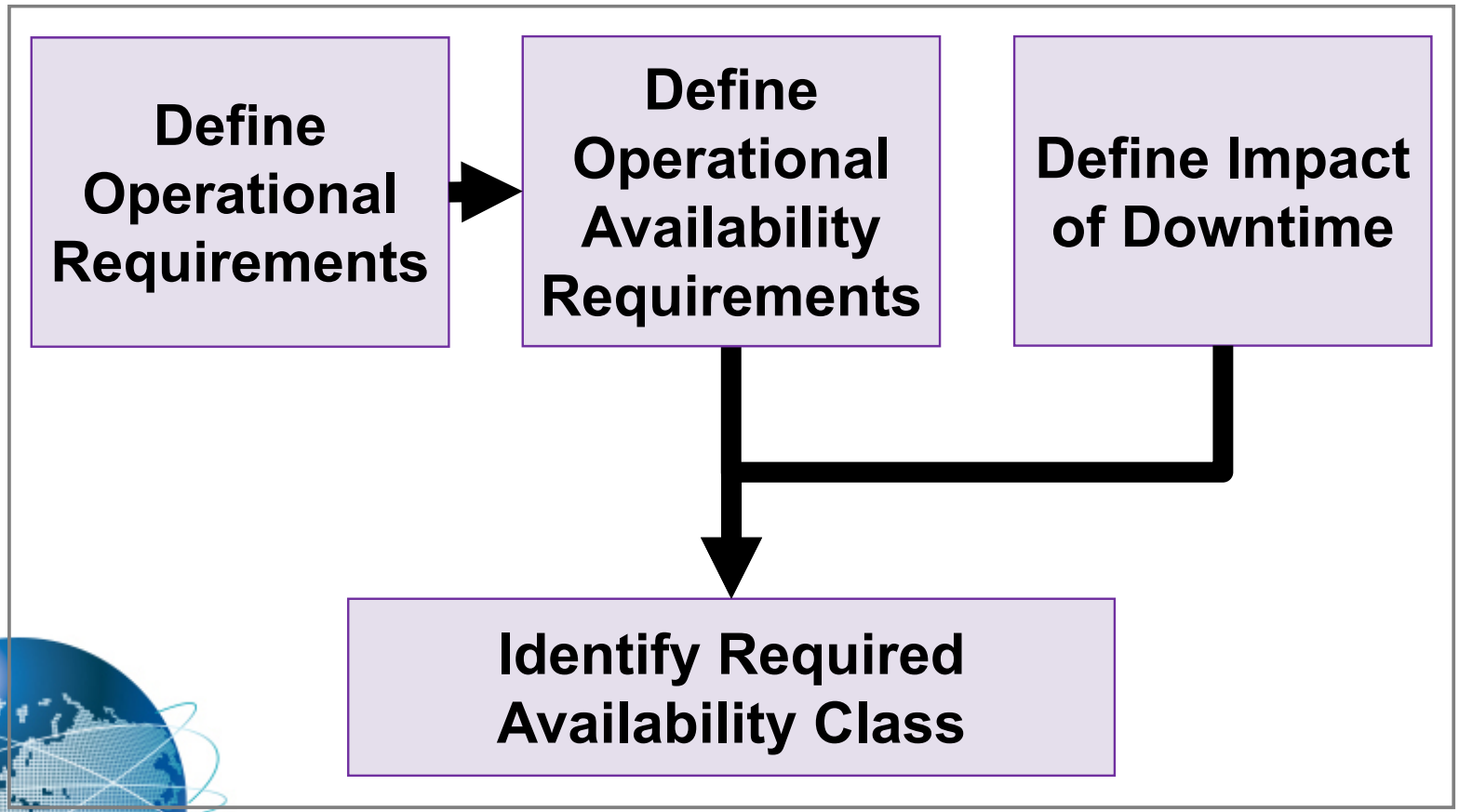
BICSI Design Class Determination

- Based on three questions

    1. How much downtime per year will be allowed for maintenance?
    2. During scheduled operation, what is the maximum allowed downtime?
    3. What is downtime's impact to operations?

- Answers will indicate design class for starting point of requirements

Interaction of Answers



Finding the Right Design

- Identify the availability requirements
- Determine the impact of downtime

Impact of Downtime (from Table B3)	*Operational Availability Level (from Table B2)*				
	0	*1*	*2*	*3*	*4*
Isolated	Class 0	Class 0	Class 1	Class 2	Class 2
Minor	Class 0	Class 1	Class 2	Class 3	Class 3
Major	Class 1	Class 2	Class 2	Class 3	Class 3
Severe	Class 1	Class 2	Class 3	Class 3	Class 4
Catastrophic	Class 1	Class 2	Class 3	Class 4	Class 4

- Obtain the right Availability Class

BICSI DC Design Classes

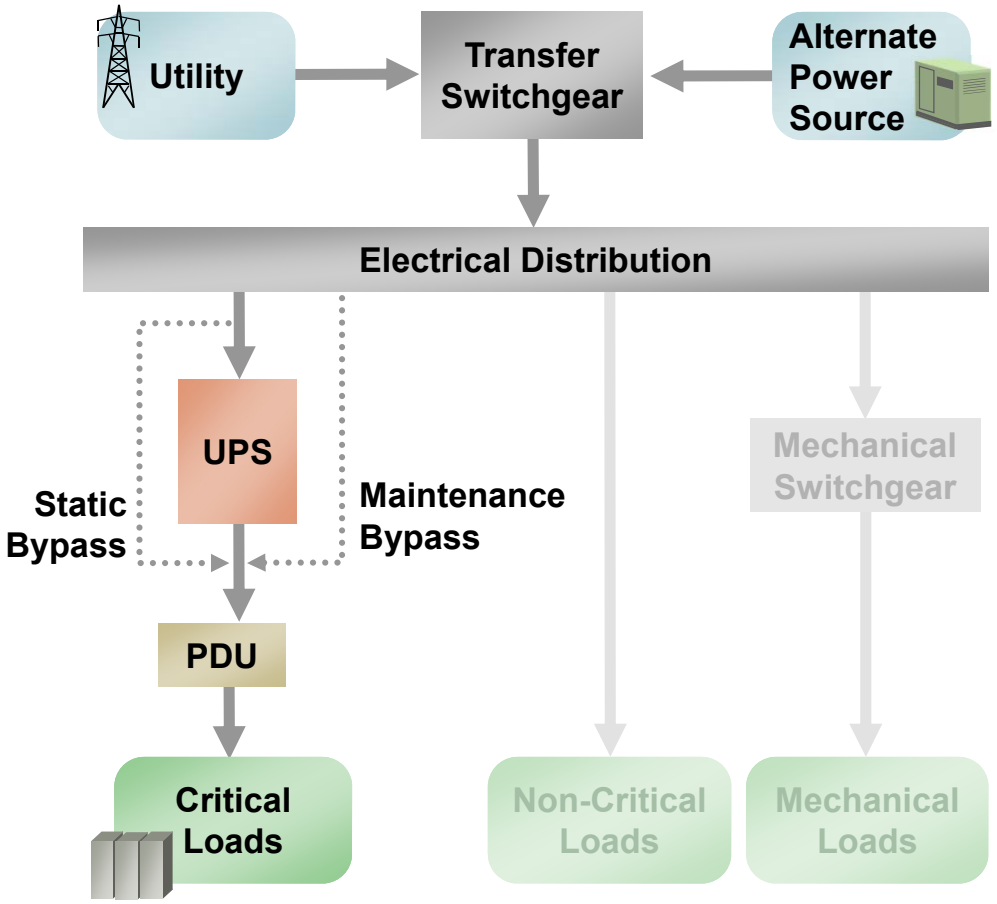
- Class 0: Single path, and fails to meet one or more criteria of Class 1
- Class 1: Single path
- Class 2: Single path with redundant components
- Class 3: Concurrently maintainable & operable
- Class 4: Fault tolerant

Availability Class Prefixes

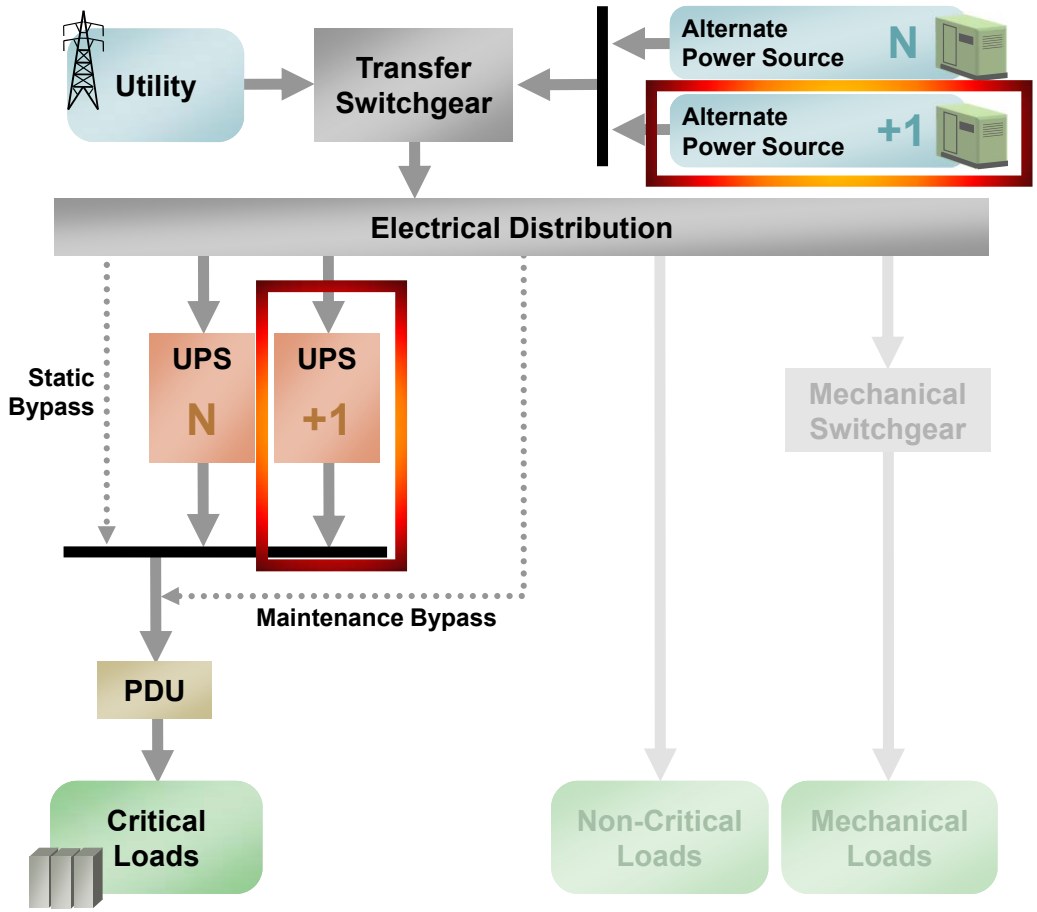
- Class F*x*: Facility (Electrical & Mechanical)
- Class C*x*: Cable Plant
- Class N*x*: Network Infrastructure
- Class S*x*: Data Processing and Storage Systems
- Class A*x*: Applications

BICSI

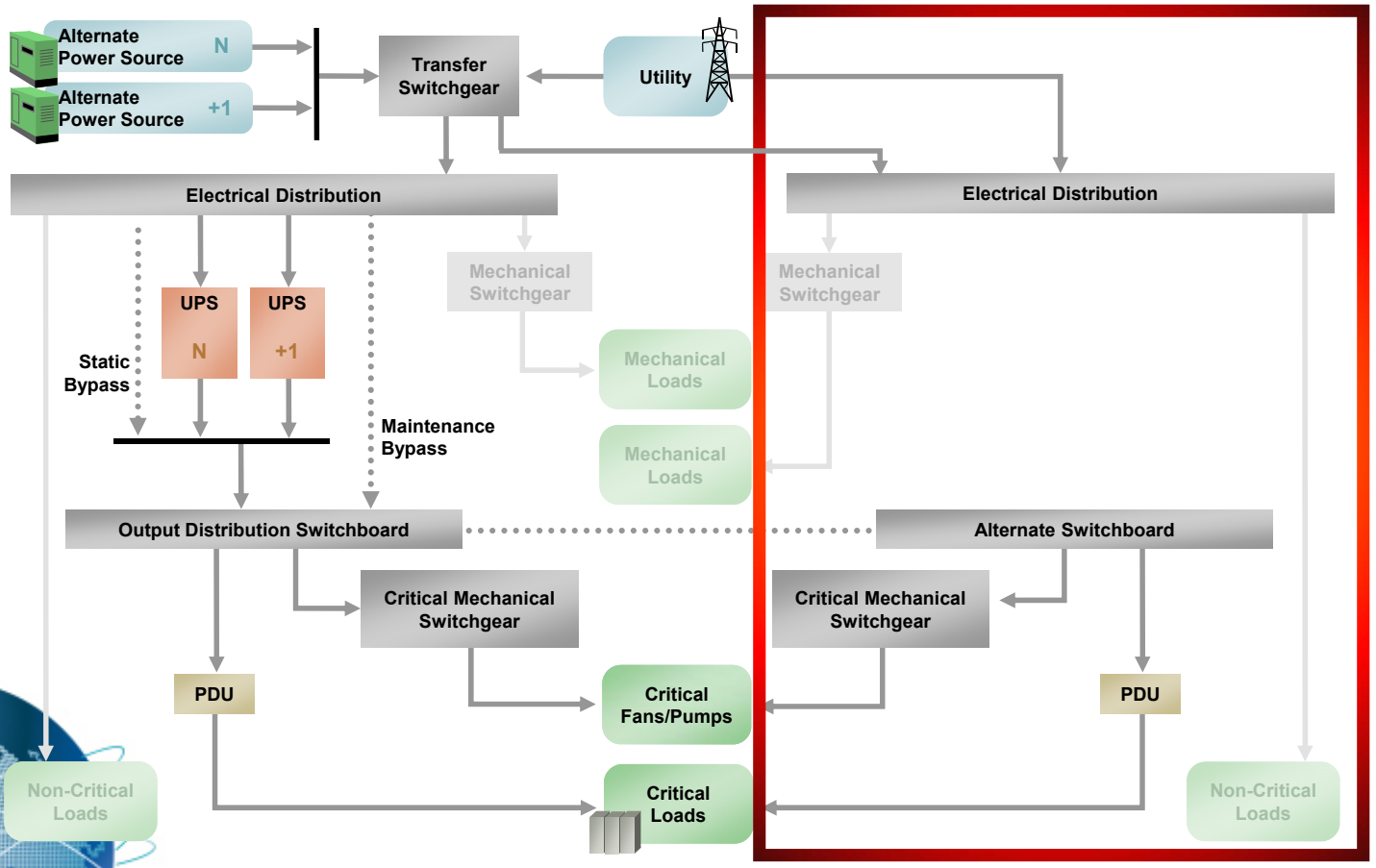
Class F1 Electrical Example



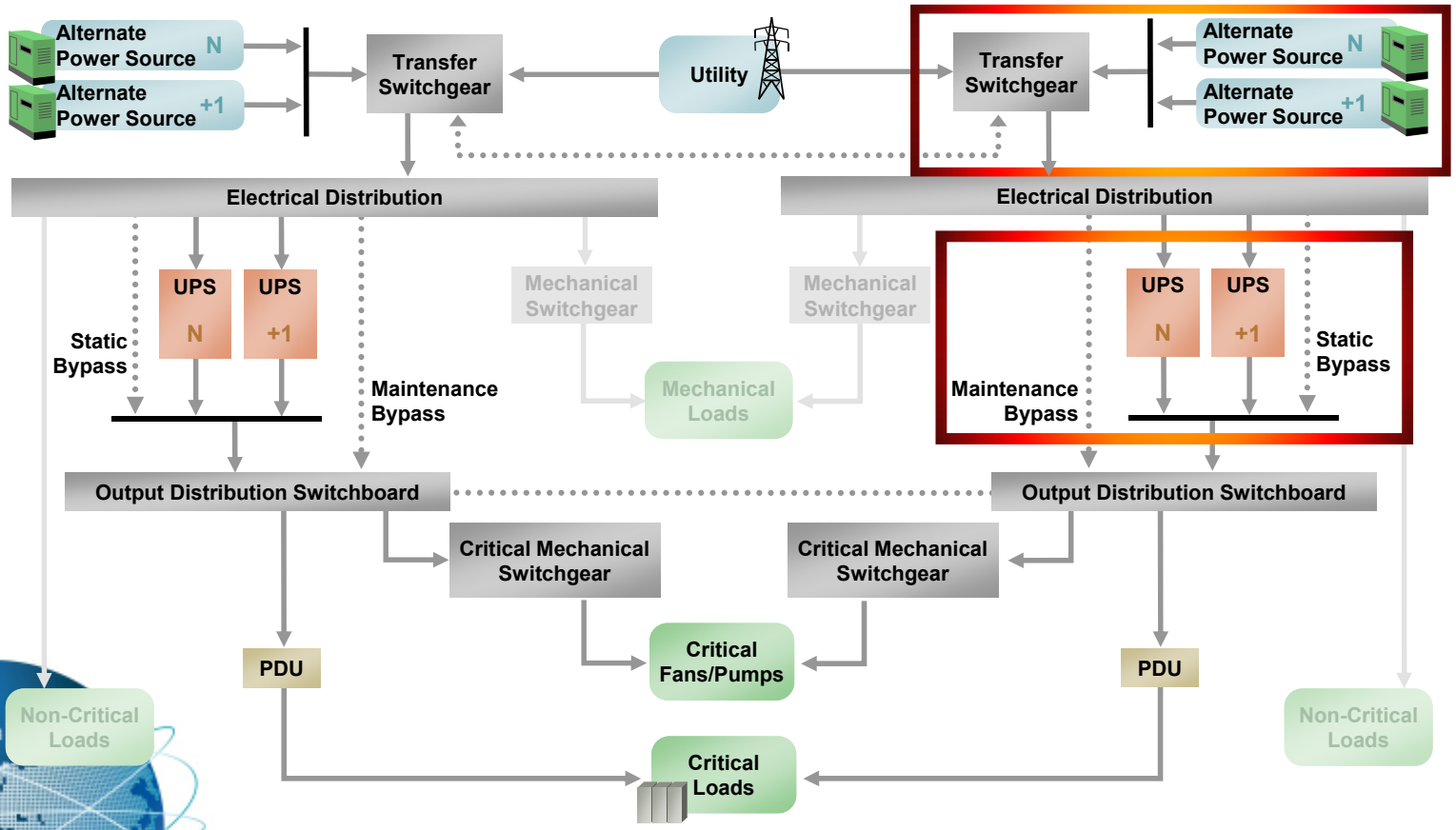
Class F2 Electrical Example



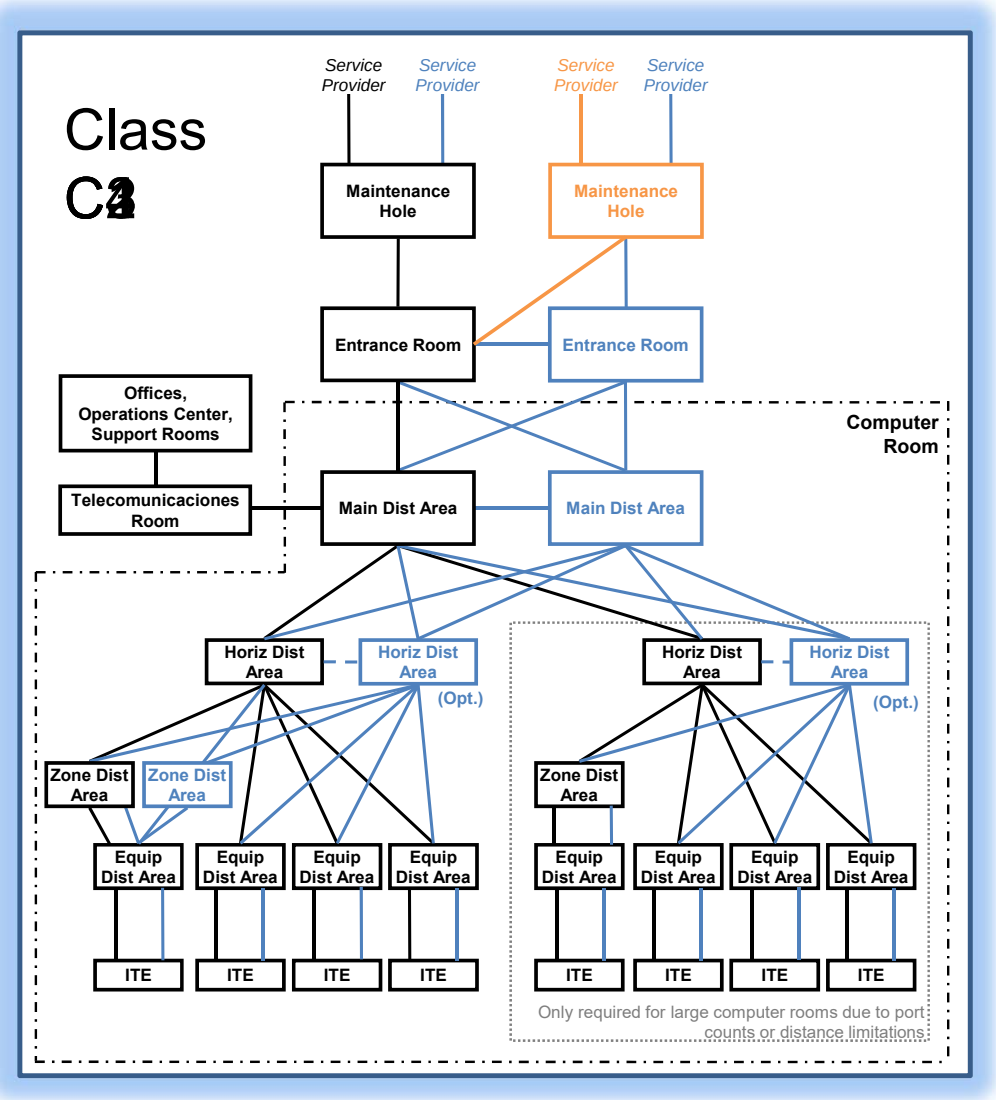
Electrical Class F3

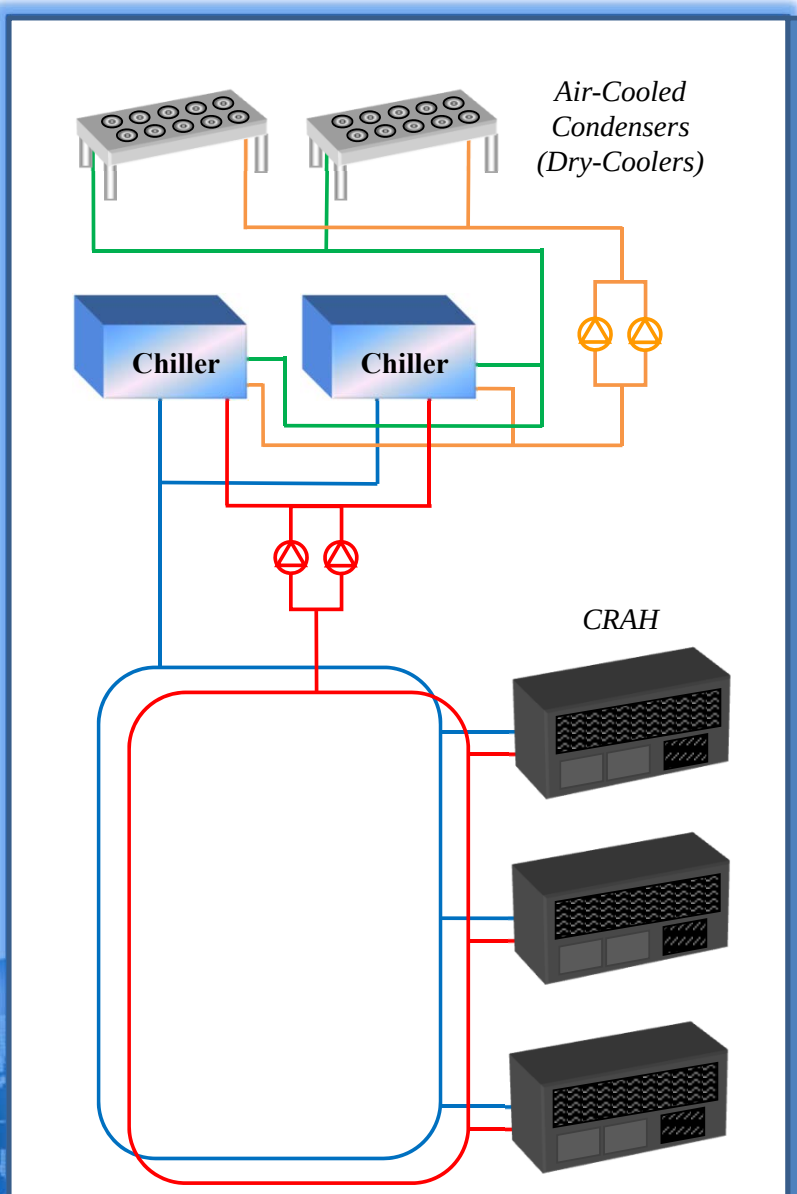


Electrical Class F4



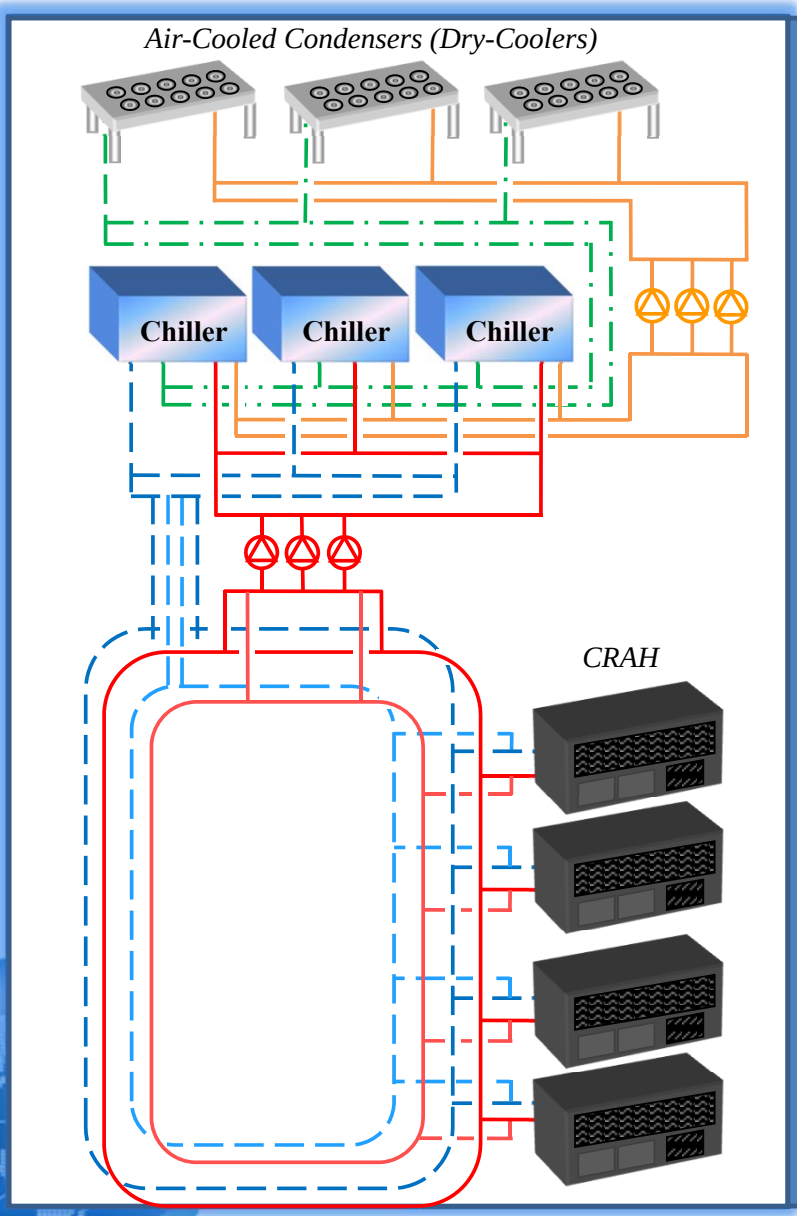
Telecommunication Classes





Mechanical Class F2

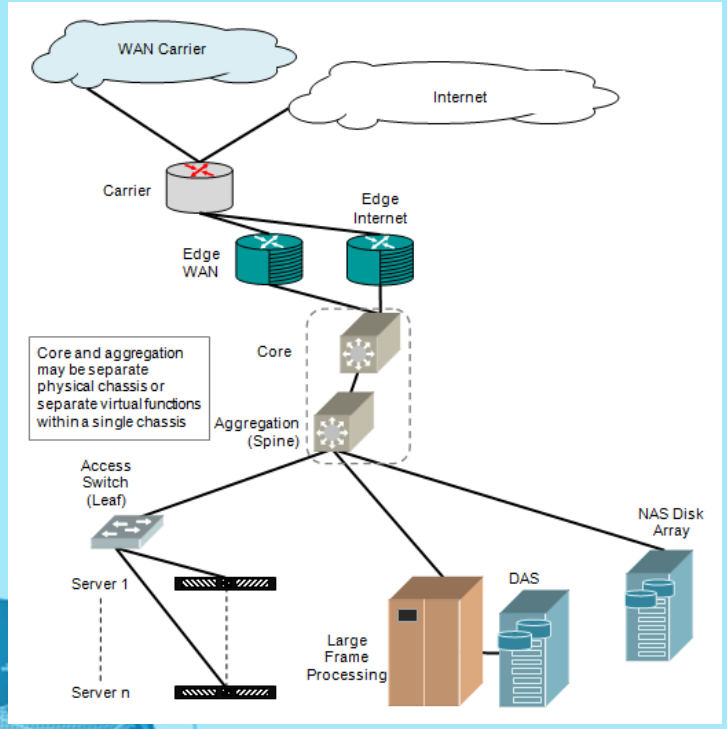
- Redundant critical components
- All power feeds from common upstream distribution
- Only redundant components able to be maintained under load

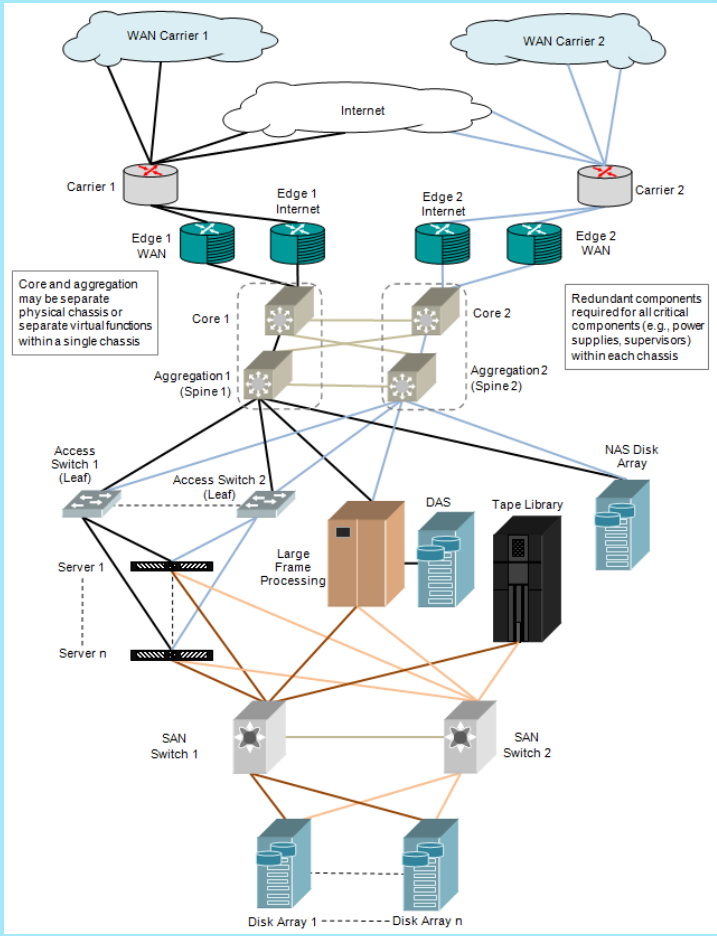


Mechanical Class F4

- Redundant equipment and piping for maintenance
- Power feed so that cooling capacity does not drop below "N" when maintaining mechanical or upstream electrical distribution
- Maintainable when actions do not decrease cooling capacity below "N"

Class N0/N1 and N4 Network





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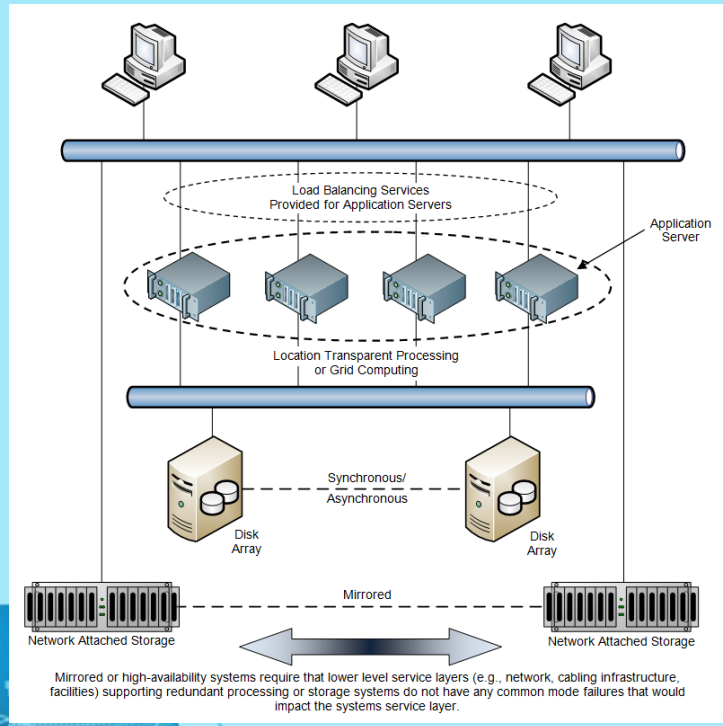
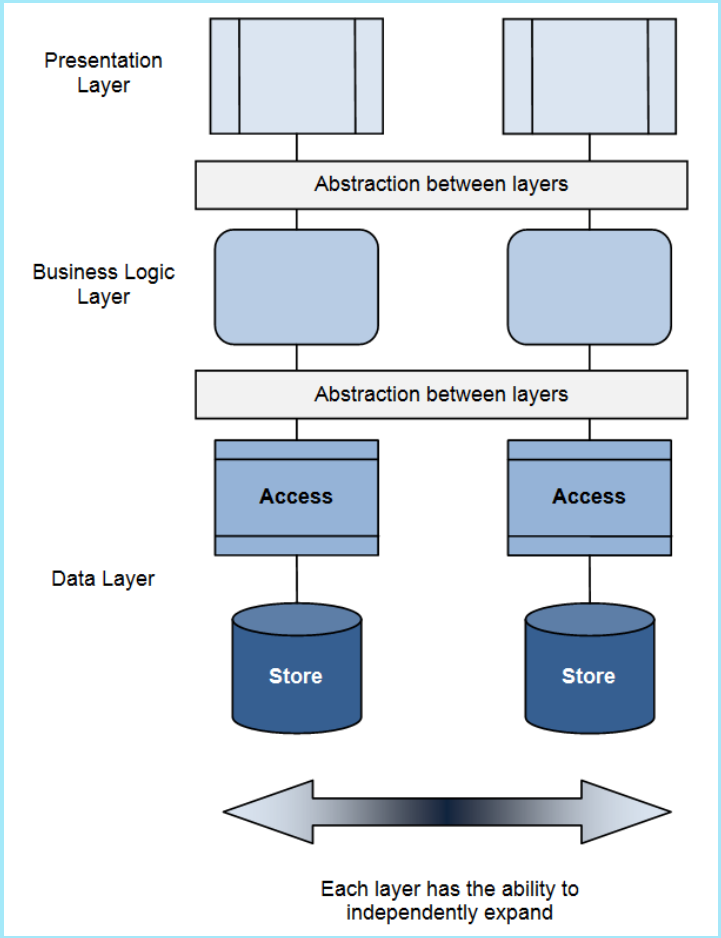
Class S4 System and A4 Application





Are BICSI & Uptime Similar?

- **ANSI/BICSI 002-2014**

*This standard provides **a reference** of common terminology and **design practice** … a **framework for** the process to determine facility criticality and to develop **optimum design & implementation solutions***

- **Uptime Tiers**

"Only data center benchmarking system developed by and for data center owners

Performance-based on fundamental concepts

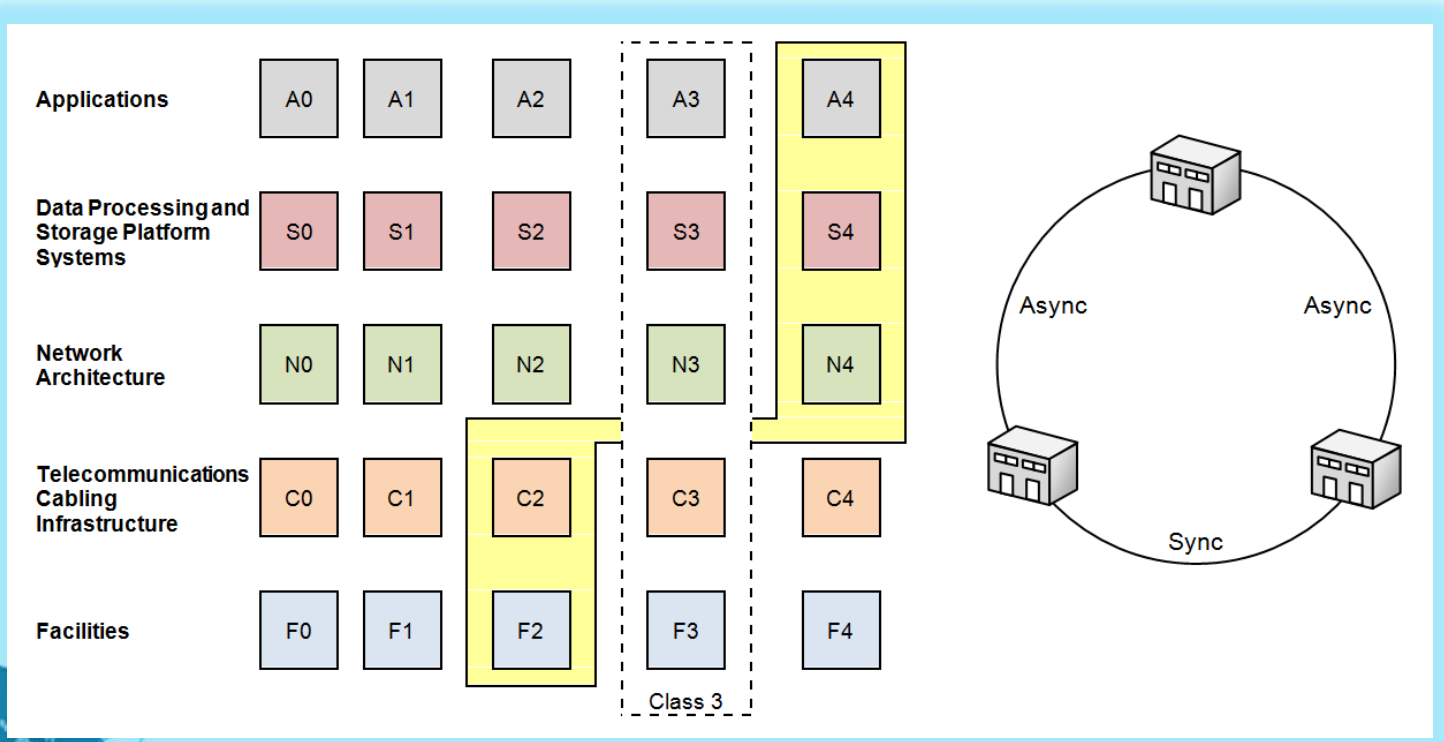
*– **Not a checklist, design menu, or cookbook**"*

Source: *Uptime Institute: Tier Classification System & Operational Sustainability* presented by Dana Smith, Director of Development, Uptime Institute at BICSI Andino 2012

Availability and Multi-Site Data Centers

- Prior to virtualization, subclasses aligned through data center
- Today, a single data center may not have alignment
- Availability class methodology can in discussions about using multiple data centers to achieve availability target

Example: Class 3 Availability Using Three Class 2 Data Centers



DC Operations Standard

- New BICSI 009 Data Center Operations standard being developed
- Includes participants from a wide variety of organizations & countries
- Use as a reference for operation & maintenance of the data center after it is built

DC Operations Standard Sections

- Governance
- Standard Operating Procedures
- Maintenance Procedures
- Emergency Operating Procedures
- Management

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Thank You!

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