

A modern data center control room with multiple computer workstations and a wall of monitors displaying various data visualizations. The room features a curved desk with several workstations, each equipped with a computer monitor and keyboard. The background wall is covered with numerous monitors showing various data visualizations, including maps, charts, and graphs. The room is dimly lit, with a prominent green light strip on the ceiling and a large, dark, cylindrical pillar in the foreground. The overall atmosphere is professional and high-tech.

# Infrastructure Standard for Data Centers

ANSI/CSA/EIA/TIA-942 (PN-3-0092)

# Introduction

- When approved, the standard will be:
  - ANSI/CSA/EIA/TIA-942
  - Telecommunications Infrastructure Standard for Data Centers
- An official U.S. and Canadian standard for data center infrastructure
  - ◆ ANSI – American National Standards Institute
  - ◆ CSA – Canadian Standards Association
  - ◆ EIA – Electronics Industries Alliance
  - ◆ TIA – Telecommunications Industry Association
- The basis for an international standard by the ISO

# Who is Developing the Standard

- The standard is being developed by the TIA TR-42.1.1 Committee as Project No. 3-0092.
- Participants include more than 60 organizations including:
  - ◆ Architecture & Engineering Firms
  - ◆ Manufacturers
  - ◆ Consultants
  - ◆ End Users
- Most of the content was contributed by a small team of experts, but is reviewed by a large audience including industry organizations.

# Major Contributors

- TELECOM
- ARCHITECTURAL
- ELECTRICAL
- MECHANICAL
- STRUCTURAL
- FIRE SUPPRESSION
- SECURITY

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EYP MISSION CRITICAL FACILITIES, INC.

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PARADIGM STRUCTURAL ENGINEERS, INC.

DIVERSIFIED PROTECTION SYSTEMS, INC.

INTEGRATED SECURITY SYSTEMS, INC.

# Status of the Standard

- 1<sup>st</sup> official draft was completed in Feb 2003.
- Committee will review and vote on the 1<sup>st</sup> round of comments this June 2003.
- The document is currently only available to committee members, contributors, and related standard setting organizations.
- The 7x24 Exchange submitted favorable comments regarding the 1<sup>st</sup> draft.
- Under review by the Uptime Institute.
- Final approval expected sometime in 2004.

# Purpose of the Standard

- Fill a void by providing standards for planning of data centers, computer rooms, co-location centers, trading floor equipment rooms, technology test labs, and similar spaces.
- The standard encompasses much more than just telecommunications infrastructure.
- Approximately half of the technical content deals with facility specifications.

# Computer Room Requirements

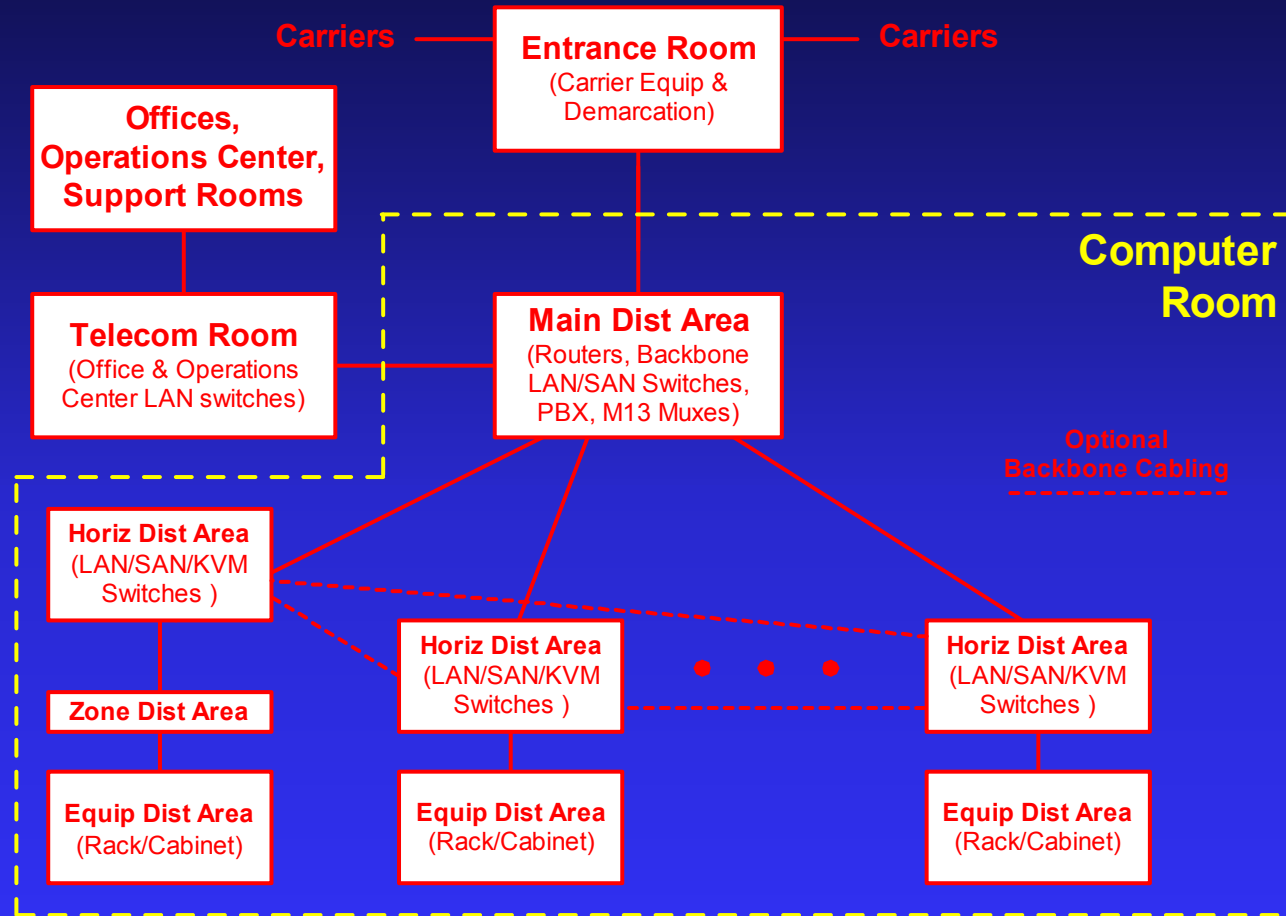
- Architectural
  - ◆ Location
  - ◆ Ceiling Height
  - ◆ Treatment
  - ◆ Doors
  - ◆ Floor Loading
  - ◆ Raised floor systems
- Environmental/HVAC
  - ◆ HVAC
  - ◆ Contaminants
  - ◆ Vibration
  - ◆ Fire Protection
- Electrical
  - ◆ Power
  - ◆ Standby Power
  - ◆ Bonding & Grounding

# Structured Cabling System

- A single flexible cabling system to handle a wide range of current and future technologies including LAN, WAN, SAN, FICON, ESCON, and console technologies.
- Simple documentation, management, and expansion.
- TIA-606 standards compliant labeling scheme for all components.
- Provision for redundant components and cabling



# Structured Cabling System



# Telecommunications Infrastructure

- Guidelines for equipment placement
- Cabinet specifications
- Guidelines regarding selecting cable types:
  - ◆ Cat 5e UTP, Cat 6 UTP, 734 coax, 50/125 multimode fiber, single-mode fiber
- Guidelines for max lengths over the cabling system - limits equipment placement & computer room size (not available in any other standard )
  - ◆ E1, T1, E3, T3, TIA-232, TIA-561/562, FibreChannel, Gigabit Ethernet, 10 Gigabit Ethernet
- Carrier coordination & demarcation

# Site Selection

- Guidelines for selection of a site for a data center
  - ◆ Architectural
  - ◆ Electrical
  - ◆ Mechanical
  - ◆ Telecommunications
  - ◆ Security
  - ◆ Other

# Facilities Specifications & Tiers

General requirements & tier specifications for each discipline (higher tier = higher availability)

- Tier 1 – basic data center
  - ◆ no redundancy
- Tier 2 – redundant components
  - ◆ Single distribution path with redundant components
- Tier 3 – concurrently maintainable
  - ◆ Multiple distribution paths with only one active
- Tier 4 – fault tolerant
  - ◆ Multiple active distribution paths

# Architectural

- Site requirements
- Parking
- Multi-tenant Occupancy within Buildings
- Building Construction
- Building Components
- Doors and Windows
- Entry Lobbies
- Administrative Offices
- Security Offices
- Operations Centers
- Restrooms and Break Room Areas
- UPS and Battery Rooms
- Required Exit Corridors
- Shipping and Receiving Areas
- Generator and Fuel Storage Areas

# Electrical

- Number of Delivery Paths
- Utility Entrances
- System Allowances for Concurrent Maintenance
- Equipment Power Cords
- Equipment 3<sup>rd</sup> Party Certification Labels
- Single Points of Failure
- Critical Load System Transfer
- Site Switchgear
- Standby Generating Systems
  - a. Generators Sized Correctly
  - b. Fuel Capacity (at full load)
- UPS
  - a. Redundancy
  - b. Topology
  - c. Maintenance Bypass Arrangement
  - d. Power Distribution Voltage Level
  - e. Power Distribution Panel Boards
  - f. Rotating UPS System Enclosures

# Electrical

- PDUs
- Grounding
- Computer Room EPO Systems
- Battery Room EPO Systems
- System Monitoring
- Battery Rooms
- Battery Configurations
- Loadbanks for Testing
- Equipment Maintenance

# Mechanical

- General System Types
  - a. Water-Cooled Systems
  - b. Chilled Water Systems
  - c. Air-Cooled Systems
- HVAC Control Systems
- Plumbing (for water-cooled heat rejection)
- Fuel Oil Systems



# Structural

- Seismic Zones
- Site Specific Response Spectra
- Importance Factors
- Anchoring of Equipment
- Deflection Limitation on Equipment
- Bracing
- Floor Loading Capacities
- Floor Hanging Capacities
- Building Structural Components
- Building Energy Dissipation (Passive Dampers/Base Isolation)

# Fire Suppression

- Fire Detection Systems
- Fire Sprinkler Systems
- Gaseous Suppression Systems
- Early Warning Smoke Detection Systems
- Water Leak Detection Systems

# Security

- Security Access Control/Monitoring at:
  - a. Generators
  - b. UPS, Telephone & MEP Rooms
  - c. Fiber Vaults
  - d. Emergency Exit Doors
  - e. Accessible Exterior Windows/Openings
  - f. Security Operation Centers
  - g. Network Operation Centers
  - h. Security Equipment Rooms
  - i. Doors into Computer Rooms
  - j. Perimeter Building Doors
  - k. Doors from Lobby to Data Center Floor
  
- Bullet Resistant Walls, Windows, and Doors
- CCTV Monitoring
- CCTV Recording of All Activity on All Cameras

# Telecommunications

- Cabling system meets standard specifications
- Carrier entrance facility diversity
- Carrier right-of-way diversity
- Redundant cabling
- Redundant routers and switches
- Labeling of patch panels and outlets
- Labeling of patch cords
- Cabling system documentation

# What Does It All Mean?

- TIA-942 is the first official standard for data center infrastructure.
- Primarily a telecom infrastructure standard, but about half of the content deals with facility requirements.
- Provides a flexible and manageable structured cabling system using standard media.
- Guidelines on a wide range of subjects useful to someone designing or managing a data center.
- An official tiering standard for determining the quality of a center. A way to objectively compare one center with another.