An Inside Look at Outside Plant
BICSI Region Meeting 2007

Agenda

- What is CO-OSP?
- A close look at the 758-A standard
- Available Resources
What is CO-OSP?

- Customer Owned Outside Plant
- “Telecommunications infrastructure designed for installation exterior to buildings”

ANSI/TIA/EIA-758-A terminology
CO-OSP Standard


This standard replaces the ANSI/TIA/EIA-758 and 758-1 documents. (1999)
Why do I have to know these standards?

You have to know these standards if:

- You do work on customer owned property
- You’d like to give your customer a system that will work regardless of the electronics they choose
LET’S TAKE A LOOK INSIDE THE CO-OSP STANDARD

ANSI/TIA/EIA-758-A
Customer-owned Outside Plant Telecommunications Infrastructure Standard
Discussion of the contents!

- Introduction and Scope
- Definitions, Acronyms, Weights, and Symbols
- Cabling Infrastructure
- Pathways and Spaces
- Cabling Hardware
- Annexes
INTRODUCTION

• Customer owned campus facilities are typically termed “outside plant”

• In this standard they’re called “Customer-owned OSP”
INTRODUCTION

• Two categories of criteria are specified:
  Mandatory and Advisory Terms
  Mandatory word is “SHALL”
  Advisory words are “SHOULD”, “MAY”, and “DESIRABLE”
INTRODUCTION

- Mandatory criterion applies to performance and compatibility requirements
- Advisory criterion is “above minimum” goals.
Introduction

- Metric dimensions are “soft” conversions of US units
  (100mm soft converts to 4 inches)
- Conduit dimensions are listed as follows: 21 (3/4) trade size conduit
  That’s 21mm and/or 3/4”
  (You won’t see the mm or in)
INTRODUCTION

- The standard is a "living document" which means it can be revised or updated due to advances in construction techniques or technology.
SCOPE-Applicability

- The standard specifies minimum requirements for CO-OSP
- Specifies cabling and the pathways and spaces to support it
- Useful life of OSP Pathways and Spaces is 40 years
- Useful life of OSP Cabling is 30 years
Scope - Applicability

Now isn’t that convenient!

The useful life of pathways is 40 years
The useful life of the OSP cable is 30 years
The useful life of an OSP engineer is 29 years 364 days
SCOPE-
Pathways and Spaces

• There are two basic types of cable pathway systems:

  Underground and Aerial
SCOPE

- **Underground Pathways and Spaces**
- Direct Buried
- Buried Duct/Conduit
- Maintenance Holes, Handholes
- Shared Spaces (utility tunnels)
SCOPE-
Pathways and Spaces

• Aerial Pathways and Spaces

Poles
Messenger Wire or Strand
Anchoring Guy Wires
Anchors
SCOPE - Customer Owned OSP Cabling

- Consists of recognized cable
- Conforming connecting hardware
- Protective Devices which can be located on the exterior or interior of a building or in an outdoor pedestal or cabinet
SCOPE-
Customer Owned OSP Cabling

- Can have intermediate splices
- Fiber Optic Cabling may pass through a building entrance facility as part of the cable route
- Star topology recommended
Normative References

- The standard references 54 other standards and codes which, by reference, constitute part of the standard
TERMS AND DEFINITIONS

The CO-OSP standard contains:

- 77 definitions
- 49 acronyms
- 14 weights and measures
- 59 symbols
TERMS AND DEFINITIONS
Let’s look at one definition

**Entrance facility** (telecommunications):
An entrance to a building for both public and private network service cables, (including wireless), including the entrance point of the building and continuing to the entrance room or space.
Terms and Definitions

• For most service providers (SP) or access providers (AP), that represents a change to the ways we learned.

• The entrance facility was the place in the building we stopped our cable and terminated it.
CABLING INFRASTRUCTURE
Topology

- Recommended topology is a star
- Large Campuses use a hierarchical star
- Stars offer centralized management and administration
- Distance limitations may prohibit the use of a star topology
CABLING INFRASTRUCTURE
Recognized Cables

- 50/125 optical fiber cable
- 62.5/125 optical fiber cable
- Singlemode optical fiber cable
- 100 ohm Twisted Pair Cable
- 75 ohm Coaxial Cable
CABLING INFRASTRUCTURE
Media Selection

• Choose the cable considering:
  Characteristics of the applications
  Distances
  Future growth (population)
  Customer preference
  Required useful life
  Flexibility with respect to supported services
CABLING INFRASTRUCTURE
Bonding and Grounding

- A critical component of design
- Protects people and property
- Improper bonding and grounding can affect other telecomm circuits
CABLING INFRASTRUCTURE
Bonding and Grounding

POOR or incomplete Bonding and Grounding can create:

- Equipment malfunction or failure
- Insurance issues you don’t want
- Injury or death to personnel
- Noise on voice circuits
- Loss of manufacturer’s warranty
Pathways may be aerial, direct buried, or underground. Underground or direct buried is preferred over aerial. Underground is preferred over direct buried.
PATHWAYS AND SPACES
Subsurface Pathways

- **Design should consider:**
  
  Excavation -
  Clearances and separations,
  Depth, Backfill, and Restoration,
  Trenching, Boring, Plowing.
  Street Crossings, Casings.
PATHWAYS AND SPACES
Conduit/Duct

- EB Type - Encasement in concrete
- DB Type - Direct Buried or encased
- Rigid Non-Metallic Sched. 40 or 80
- MPD- Multiple Plastic Duct
- Rigid Metallic Conduit
- IMC- Intermediate Metallic Conduit
- Fiberglass Duct - DB or encased
- Inner duct - PE or PVC

Note- The NEC says “metal” not
“metallic”
PATHWAYS AND SPACES
Conduit/Duct

• Encase bends (non-metallic)
• 600 ft max. between pulling points
• No more then (2) 90’s or a total of 180 degrees
• Drain slope should be is 1/8” per foot:
  Exiting or entering a building or from the middle of a conduit span (each way)
• Innerduct may be placed within a duct to facilitate initial and subsequent placement of multiple cables in a single duct.

Note- Innerduct can be plastic or fabric textile duct
PATHWAYS AND SPACES
Subsurface Considerations

• Duct plugs on ALL conduits
• Axial Movement- Bridge Crossing
• Tunnel Requirements

OSHA
Sheath properties and clearances
PATHWAYS AND SPACES
Aerial Construction

Consider:

- Pole class, length, type, depth.
- All loading factors
- Grounding, clearances, separation
- Anchors/guys, riser protection
- Span lengths, slack spans, etc.
- Lashing, strand tension, sag.
AERIAL CONSTRUCTION

- Poles commonly used in the telecommunications world are:
  Height- 30’, 35’, 40’ or 45’
  Class- 9 classes – 1 thru 10
    (Class 8 was eliminated)
  Most common - 3, 4, 5, 6, 7
PATHWAYS AND SPACES
Maintenance Holes

- Location considerations:
  Terrain (Topography)
  Soil Conditions
  Surrounding Structures
  Personnel Access
  Placing and Splicing Ease
PATHWAYS AND SPACES

Maintenance Holes

- Maximum distance **shall** not exceed 600 feet
- Not within 50’ of curb radius at an intersection
- In the right of way but outside the traveled portion
  (if placed within the traveled portion then 5 feet from the curb)
PATHWAYS AND SPACES
Maintenance Holes

- Concrete, steel, or cast iron
- Must have proper load ratings
- Can be pre-cast or site poured
- May have multiple openings
PATHWAYS AND SPACES
Maintenance Holes

- Maintenance holes shall be equipped with:
  Corrosion resistant pulling irons
  Corrosion resistant cable racks
  Sump for drainage and ........
PATHWAYS AND SPACES
Maintenance Holes

**SHALL NOT BE SHARED**
WITH ELECTRICAL
INSTALLATIONS

(other than those needed for telecommunications equipment)
PATHWAYS AND SPACES
Maintenance Holes

- TYPES
  A - end wall entrance only
  B - handhole
  J - end and sidewall entrance
  V - one end wall and two side walls
PATHWAYS AND SPACES
Maintenance Holes

- “Covers shall meet the environmental conditions”
  - Heavy Vehicle Traffic
  - Lighter Loads
  - Sidewalk
PATHWAYS AND SPACES
Handholes (Advanced Warning)

The slide you are about to see may cause nausea, disbelief, glazed vision, or create some serious doubt about your presenter’s credibility.
PATHWAYS AND SPACES
Handholes

- Shall not be used in place of a MH
- Shall not to be used for splicing
- Shall not be shared with electrical
- Shall not exceed a 4’ X 4’ X 4’
- Should not be used in runs of more than (3) 4” conduits
- Should align conduits on opposite walls at the same elevation
PATHWAYS AND SPACES
Pedestals and Cabinets

- Should accommodate 4 cables
- Cable bend radii not less then 15 times the diameter of the cable
- Corrosion Resistance
- Customer Preferences
- Meet ASTM requirements
PATHWAYS AND SPACES
Pedestals and Cabinets

- Resistant to rodent and insects
- Secure - Locks, special bolts, etc.
- Chemically resistant
- Grounding and bonding to Codes
PATHWAYS AND SPACES
Other Spaces

- Vaults:

  Are open or closed bottom housings which provide grade level or below grade level environmental protection, access, and security to splices, cable, and distribution equipment.
PATHWAYS AND SPACES
Vault Selection Concerns

- Cable bend radii (15x cable)
- Accommodate four cables
- Accommodate both inline and butt splices
- Secure with locks, bolts, etc
- Provisions to relocate if needed
- Resistant to rodents/insects
PATHWAYS AND SPACES
Traffic Loadings

- Maintenance Holes and Vaults have **three basic load ratings**
  - H-5 Sidewalk applications (11K lbs..)
  - H-10 Driveways/Parking Area (22K)
  - H-20 Heavy Traffic (40K)
CABLING
Twisted Pair Cable

- 19, 22, 24, or 26 AWG
- Meet all ANSI/ICEA requirements
- Recommended applications for Filled and Air Core cables (R,S,N)
- Meet AHJ and applicable codes
CABLING
Twisted Pair Specifications

- Filled cable is recommended (R) for aerial, direct buried, and UG.
- Air Core is suitable (S) for aerial and UG and not recommended (N) for direct buried.
CABLING
Connecting Hardware

- Withstand temperature range of -40 degrees F to 158 degrees F
- Can be plastic or metal
- Must meet requirements of ANSI/TIA/EIA 568-B
- Terminal blocks must allow access to test points without disconnecting the service drop or puncturing the insulation