Infrastructure of a Hotel

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  - Bob Stoutenburgh
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Presenters

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Seminar Outline

• **Infrastructure Overview**
  – Definition and Scope
  – Media Types
  – Structured Cabling Design

• **Applications**
  – Application Components
  – Application Protocols
  – Media Compatibility
  – Integration and Convergence
Infrastructure Overview
A Hotel Infrastructure is a set of delivery mechanisms and methods which connect end users to on-site and external services.

To evolve, we must think in terms of integrating all applications used by guests and staff into an integrated and universal set of cabling and wireless architecture.
Infrastructure Definition

INFRASTRUCTURE

USERS ← SERVICES
Infrastructure Overview

- **Scope: Low Voltage** Cabling and Applications
- **Application Servers**
  - PBX, PMS, POS, CAS, HSIA, CATV, IT Servers
- **Media Distribution**- Connect Servers to Users
- **Media Types**
  - Physical Cabling
  - Wireless supplements Wired
Media Distribution

• **Wired**
  – Physical Cables Connect Users to Services
  – Generally Use One Cable per User per Application
  – Users Restricted to Predetermined Locations

• **Wireless**
  – Electromagnetic Transmissions
  – Users Can Be Located Anywhere in Range
  – Wireless Equipment Itself Must be Wired
Wired Infrastructure Design

• **MDF** – Main Distribution Frame
  – Server / PBX Room
  – Centralized Location for Servers

• **IDF** – Intermediate Distribution Frame
  – Consolidate User Connections Within a Physical Area
  – Media Conversion
    • Wireless to Wired
    • Copper to Fiber
Wired Infrastructure Design

- MDF and IDF Connectivity Hardware
  - 66 Blocks
  - 110 Blocks
  - Patch Panels
Wired Infrastructure Design

- **User Work Areas**
  - Wired Media Terminated on Wall Mounted Jacks
  - Users Must Have Compatible Equipment

- **Conduits and Junction Boxes**
  - Physically House and Route Cabling
  - Protect Cabling from Kinks and Bends

- **Modular Wall Jacks**
  - Allow Interchanging and Mixing of Jack Types
Wired Media Types

• **Telephone**
  – Traditional Unshielded Single Stranded Copper Cabling
  – 2, 4, 6, or 8 cable pairs

• **Twisted Pair**
  – Single Stranded Copper Cabling, Twisted in Pairs
  – Twists Provide Protection from Interference
  – High Data Transmission Rates
  – Category 3, 5, 6, etc.
  – Shielded or Unshielded
Wired Media Types

• **Coaxial**
  – Highly Shielded
  – Wire Jacket Surrounding Single or Dual Stranded Core
  – CATV
  – High Data Rate

• **Fiber Optic**
  – Single or Multi Strands
  – Long Distance Transmissions
  – Virtually Unlimited Data Rate
Wired Media Regulation

- As of July 8, 2000 FCC regulations require that all new inside wiring for telecommunications conform to Category 3 Twisted Pair performance requirements or better.

- FCC encourages the use of more advanced media types (CAT5, optical fiber) wherever feasible, as well as liberal wall jack placement.
Wireless Infrastructure Design

Point to Point
- Interconnect Buildings
- Connect a Main Area to a Remote Area
- Permanent or Temporary Links

• **Point to Multipoint** (Broadcast)
  - Connect a Main Area to Many Mobile or Stationary Users
  - Users Can Be Located Anywhere Within signal “Footprint”
Wireless Media Types

- **Infrared**
  - Point to Point Connections up to 5 km
  - Susceptible to Fog, Rain or Snow
  - Narrow Transmission Angle – Straight Line of Sight

- **Microwave**
  - Point to Point Connections up to 50 km
  - Medium Transmission Angle – 30 Degrees of Visibility

- **Radio Frequency**
  - Point to Point and Point to Multipoint up to 2 km
  - Ultra Wide Transmission Angles up to 360 degrees in 3 Dimensions
Infrastructure Summary

• Media Carries Services to Users

• Media Designs are:
  – Segmented and Structured
  – Modular and Flexible

• Multiple Media Types Support a Variety of Applications

• Disparate Systems Can and Should Be Integrated Within A Single Infrastructure
Applications
Application Examples

- **Voice**
  - PBX Extension
  - Voice Mail
  - External Telephone Networks

- **Data**
  - File and Print Servers
  - POS / PMS
  - HSIA
Application Examples

- **CATV**
  - Television Networks, VOD
  - Games
  - HSIA / Concierge
- **Fire**
- **Security**
  - Cameras
  - Card Key Server
Application Characteristics

• Application Components
  – Local Server (PBX, PMS, HSIA, Security)
  – External Service (PSTN, Internet, Television Networks)
  – End User Device (Telephone, Computer, Door Lock)
  – Software, Content

• Applications Communicate Via Protocols

• Applications Traverse Media
## Protocol Layers

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<th>Layer</th>
<th>Examples</th>
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<td>IP, IPX, Touch Tones, DNIS</td>
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<td>Data Link</td>
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Application Protocols

• **Telephone**
  – Analog Line / Analog Set
  – Digital Circuit (T-1, ISDN-B, ISDN-PRI)
  – Proprietary Digital Set (Mitel, NEC, Panasonic)

• **Data**
  – Serial (RS-232)
  – Point to Point
  – LAN (Ethernet, Token-Ring, Wireless Ethernet)
Application Protocols

- **LAN - Wired**
  - Ethernet over Twisted Pair
    - 10BaseT, 100BaseT, 1000BaseT
  - Ethernet over Fiber
    - 100Base-FX, 1000Base-FX
  - IP (Over Ethernet)
  - IPX (Over Ethernet)
Application Protocols

• **LAN – Wireless Ethernet**
  - 802.11b – ‘WIFI’, original wireless Ethernet
  - 802.11a – Faster, not compatible with ‘b’, shorter range
  - 802.11g – Fast as ‘a’, compatible with ‘b’
  - 802.11i – Improved Security
  - 802.11e – Quality of Service Enhancements (Multimedia)
  - 802.11h – Interference reduction
  - 802.11x – “All of the Above”
Application Protocols

- Fire, HVAC, Security use proprietary protocols based on manufacturer ‘open’ standards.
- Systems that are IP based offer the greatest flexibility and integration.
Media Compatibility (Historical)

• **Voice**
  – Telephone Cabling
  – Twisted Pair
  – Radio Frequency (i.e. Cellular, “cordless”)

• **Data / LAN**
  – Twisted Pair (Ethernet)
  – Wireless (802.11)
  – Telephone Cabling (DSL, HPNA)
  – Coaxial (DOCSIS- Cable Modem)
Media Compatibility (Historical)

- **CATV**
  - Coaxial
  - Twisted Pair, Telephone Cabling (VOD over LAN)
- **Security**
  - Twisted Pair (Directly, or over LAN)
  - Coaxial (CCTV Cameras)
  - Wireless (Bluetooth, 802.11)
Media Types

• Telephone Cabling
  – PBX Extension, Voice Mail, PBX Networking
  – DSL (LAN, HSIA)

• Twisted Pair
  – PBX Extension, Voice Mail, PBX Networking
  – LAN, HSIA
  – DSL (LAN, HSIA)
Media Types

- **Coaxial**
  - CATV, VOD
  - Cable Modem (LAN, HSIA)

- **Wireless**
  - PBX Extension, Voice Mail, PBX Networking
  - LAN, HSIA

- **Fiber**
  - “All of the Above”
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**Applications**
Applications Within Applications

- Some Applications Can be Run Directly on Media or as Applications Within Other Applications
Too Many Variables!!

- Applications Can Run on Various Media Types
- Media Types can Support Various (and Multiple!) Applications
- Applications Can Sometimes Run Within Other Applications (Voice Mail – PBX Extension)
- The Optimal Arrangement Depends on Your Specific Situation!
Migration to IP

- Video over IP
- Voice over IP
- Internet Access migrates from Dial-up to direct IP connection
- IP based Security, Fire, and HVAC systems
- IP offers media INDEPENDANCE.
Separated Infrastructure

- Internet
- Voice
- Video
- PMS
- POS
- Security
- HVAC

- Ethernet
- Analog
- Coaxial
- Ethernet
- RS-232
- Coaxial
- Stand Alone

Twisted Pair
Telephone Cabling
Coaxial
Twisted Pair
Twisted Pair
Coaxial
Stand Alone
Convergence

- Internet
- Voice
- Video
- PMS
- POS
- Security
- HVAC

Networks:
- Ethernet
- 802.11
- Frame Relay
- DSL
- T-1
- ISDN / PRI
- Point to Point
- Twisted Pair
- Phone Line
- Telephone Cabling
- Coaxial
- Fiber Optic
- Radio Frequency
- Microwave

Applications
Convergence

Voice Over IP
Video On Demand
Key Card Access
HVAC

DSL

IP PBX
Video Server
Security Server
HVAC Controller

Applications
Application Summary

• Applications use Infrastructure to Deliver an End-to-End solution
• An Integrated Infrastructure Can Support Multiple Applications Using the Same Components
• Applications That Use a Common Protocol Give You Flexibility in Your Infrastructure Design and Choices