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Infrastructure of a Hotel

- Dan Phillips
- Bob Stoutenburgh
- David Hostetter

Presenters

- **Dan Phillips** – Founding partner and COO of ***ITS Inc.***, Dan manages and organizes telecommunications and data projects for leading Hotels and Hotel Companies.
- **Bob Stoutenburgh** – President of ***Future Technologies Consulting Group, Inc.***, a consulting firm that provides assistance with the design, selection, management and implementation of integrated voice, data and video communications systems.
- **David Hostetter** – Manager, Data Consulting for ***ITS Inc.***, David designs and implements infrastructure, telecom and data systems and projects for leading Hotels and Hotel Companies.

Seminar Outline

- **Infrastructure Overview**
  - Definition and Scope
  - Media Types
  - Structured Cabling Design
- **Applications**
  - Application Components
  - Application Protocols
  - Media Compatibility
  - Integration and Convergence

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Infrastructure Overview

Infrastructure Definition

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

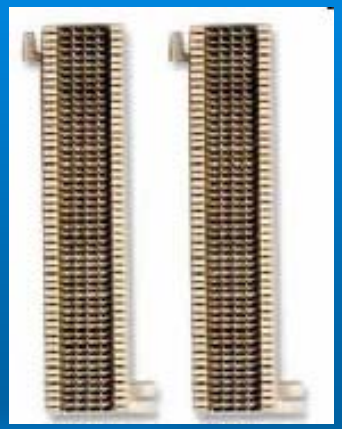
- **Wired**
  - Physical Cables Connect Users to Services
  - Generally Use One Cable per User per Application
  - Users Restricted to Predetermined Locations
- **Wireless**
  - Electromagnetic Transmissions
  - Users Can Be Located Anywhere in Range
  - Wireless Equipment Itself Must be Wired

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.

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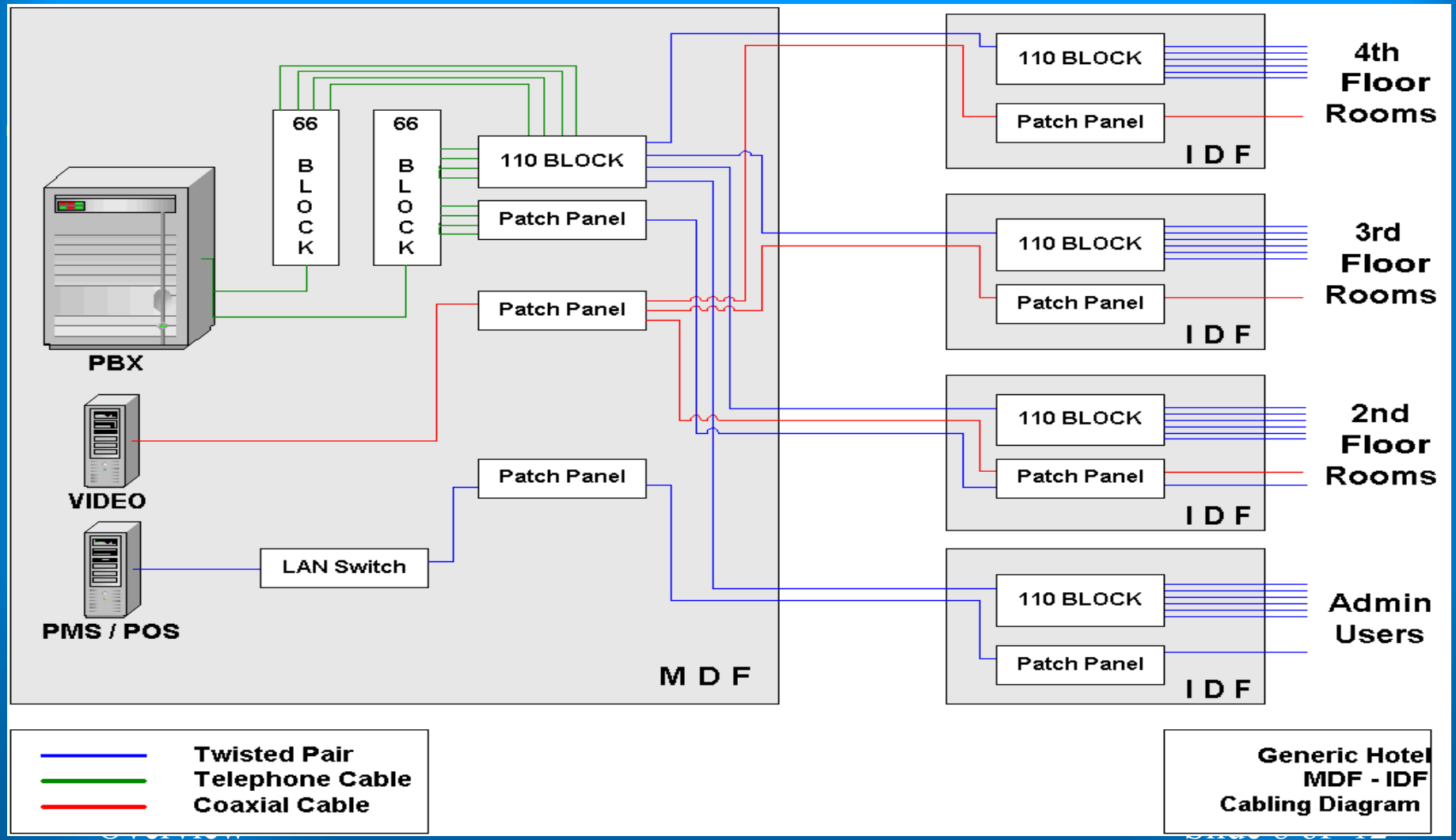

Wireless Infrastructure Design

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

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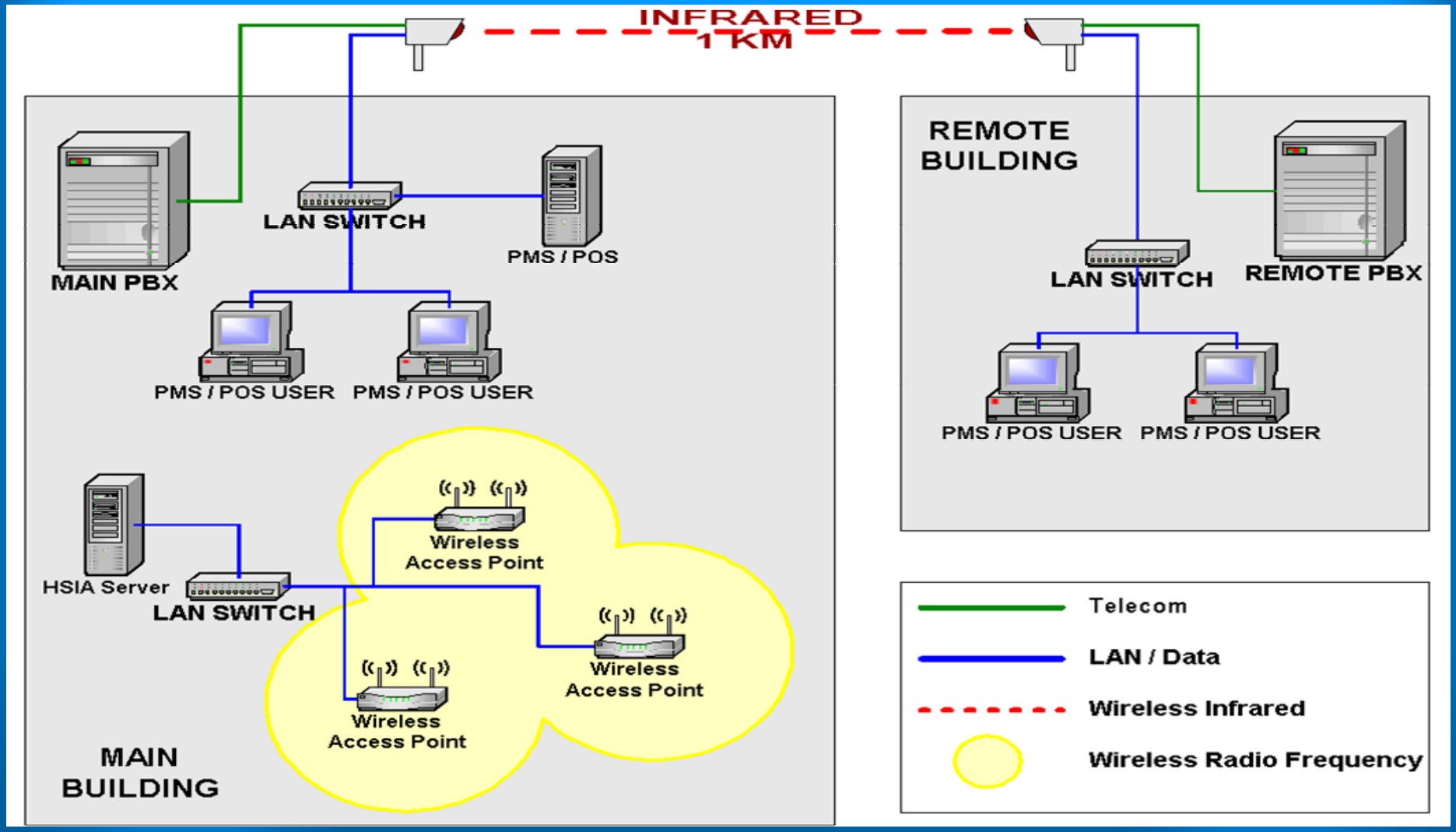

Infrastructure Summary

- **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

Application	**Web Page, E-mail, Phone Conversation, Voice mail**
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.	
Network	**IP, IPX, Touch Tones, DNIS**
Data Link	**Ethernet incl Wireless Ethernet, Token Ring, FDDI, ATM, ISDN incl. PRI, Analog telephone, Digital Telephone**
Physical	**Media Types: Twisted Pair, Coaxial, Fiber Optic, Radio Frequancy, Infrared**

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"

Protocol Layers

Application	**Web Page, E-mail, Phone Conversation, Voice mail**
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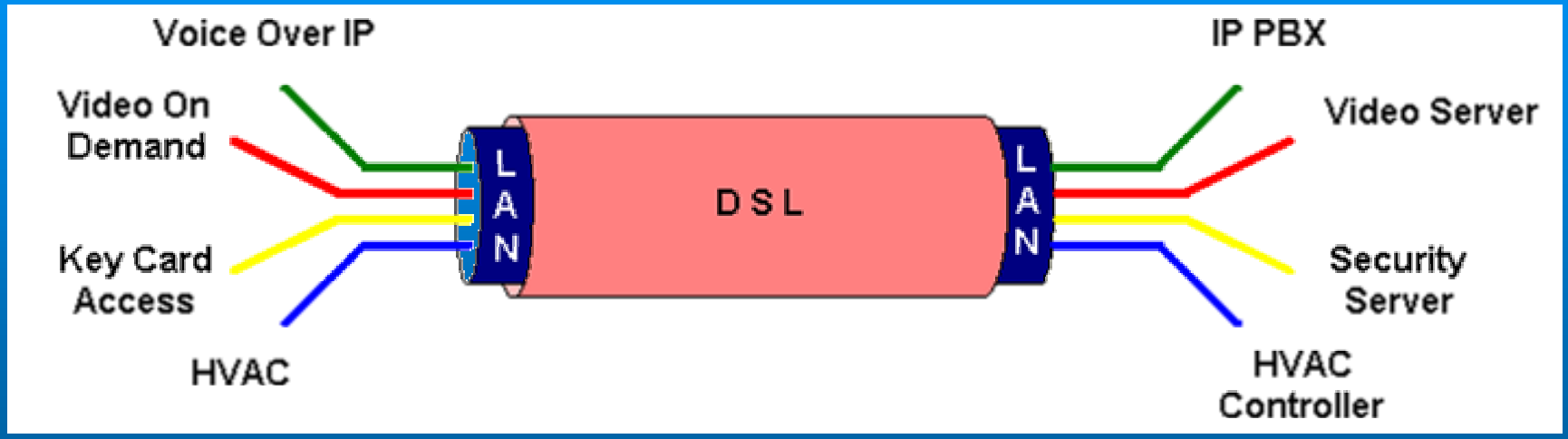
Applications Within Applications

- **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!**

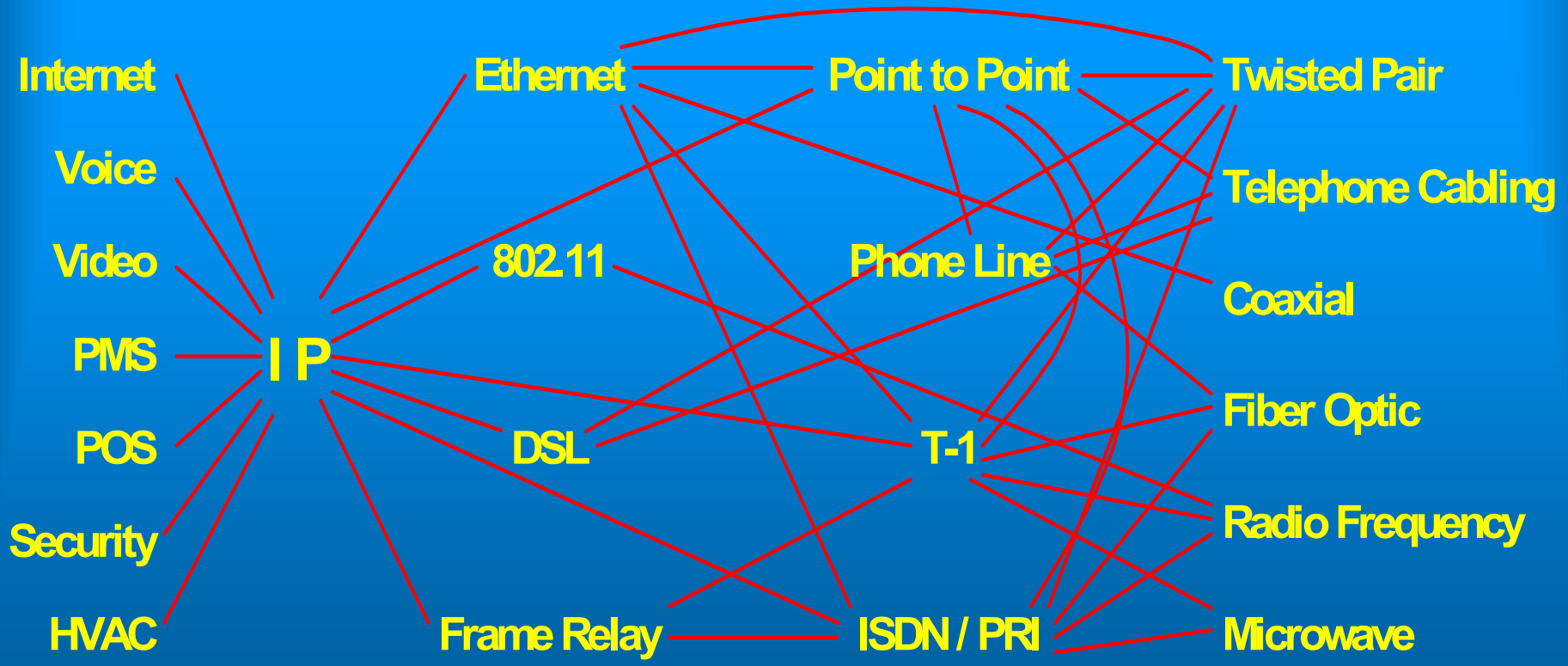
Migration to IP

- **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	Ethernet	Twisted Pair
Voice	Analog	Telephone Cabling
Video		Coaxial
PMS	Ethernet	Twisted Pair
POS	RS-232	Twisted Pair
Security		Coaxial
HVAC		Stand Alone

Convergence



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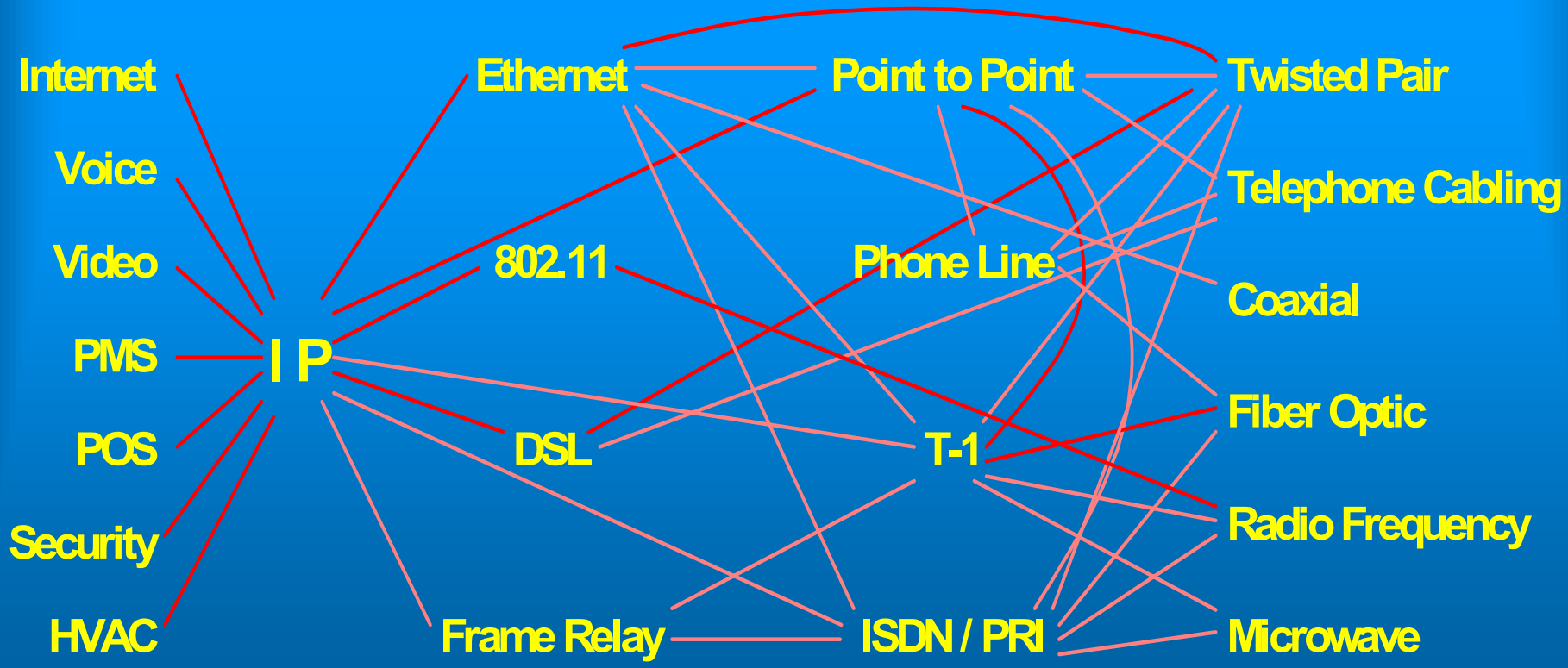

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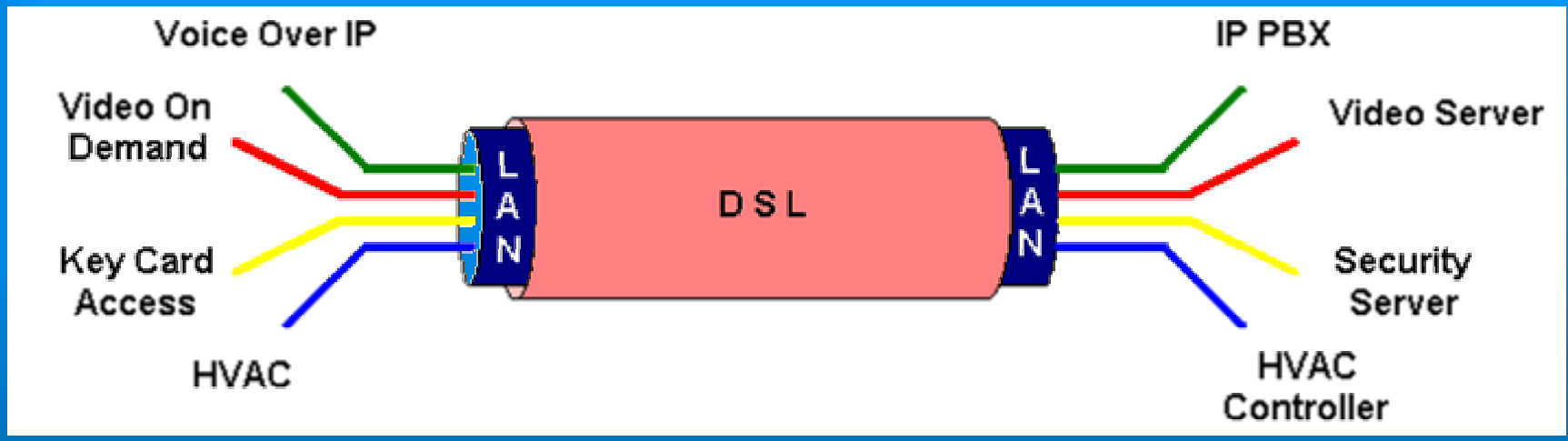

Application Summary

- **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**

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