Commercial Services Overview

Training delivered at SCTE Greater Chicago Chapter
By Justin J. Junkus, President, KnowledgeLink, Inc.
On February 28, 2008
Progressive Deregulation Opens Doors

- 1968 Carter Phone
- 1969 MCI
- 1970 Computer Inquiry 1
- 1974 Second Antitrust Suit
- 1980 Computer Inquiry 2
- 1982 Modified Final Judgment
- 1987 Computer Inquiry 3
- 1996 Communications Reform Act
Who is the Phone Company?
Commercial Services

- **Telephony**
  - Premises-based telephony
  - Centrex
  - Hosted IP
  - Trunking

- **Data Access**

- **Data Networking**
  - GigE
  - Fiber optic
  - LAN
  - WAN
  - Backbone

- **Cellular Backhaul**

- **Video**

- **Hosted Services**

- **Hospitality**

- **MTU**
Business Video

Employees informed. Customers entertained. Story at 11.

Does your business need up-to-the-minute news and entertainment?
Depends. Does it have a waiting area, conference room, break room, or management office?

Basic
Our Basic package offers an affordable option for businesses that want to stay up to speed with the latest breaking news and critical information from their local channels.

Information and Entertainment:
With a variety of popular news and entertainment channels including CNBC, The Weather Channel, Headline News, and HDTV – this digital package provides a great value.

Standard
In addition to news and entertainment, this digital package offers classic cable networks including TNT and CNN, plus amazing sports channels like ESPN. It’s the ideal package for offices with waiting areas.

Preferred
For businesses that want it all, our Preferred package comes fully loaded with the very best office-enriching news from networks like Bloomberg TV, plus all the most exciting sports action.

Packages may include these great networks and more:
## Hosted Services

### Internet Plans for Small & Medium Business

<table>
<thead>
<tr>
<th></th>
<th>Lite</th>
<th>Standard</th>
<th>Enhanced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speed</strong></td>
<td>4 Mbps/384 Kbps</td>
<td>6 Mbps/768 Kbps</td>
<td>8 Mbps/1 Mbps</td>
</tr>
<tr>
<td><strong>PowerBoost</strong></td>
<td></td>
<td>Up to 12 Mbps/1 Mbps with PowerBoost</td>
<td>Up to 16 Mbps/2 Mbps with PowerBoost</td>
</tr>
<tr>
<td><strong>McAfee Virus Scan</strong></td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Microsoft Outlook emailboxes</strong></td>
<td>2 Web Access</td>
<td>4 Web Access</td>
<td>8 Full Access</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>Commercial Modem</td>
<td>IP Gateway (Firewall/Router)</td>
<td>IP Gateway (Firewall/Router)</td>
</tr>
<tr>
<td><strong>Business Class Support - 24 X 7</strong></td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Domain Name &amp; Three Page Website</strong></td>
<td>Included</td>
<td>Included</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Static IP Addresses</strong></td>
<td>Not Available</td>
<td>Available</td>
<td>Available</td>
</tr>
</tbody>
</table>
Hospitality

Solutions For Hospitality
Delivering a wide range of leading-edge communications services that benefit your guests, patrons and business.

Contact Sales:
1-800-456-0944

Products Available
in Your Area:

COX Business Services

Cable television with非凡-ranging programming
Video on demand and video games
High-speed internet access
Local and long distance telephone service
A choice of music channels to satisfy every taste

With Cox Business as your communications partner, you're working with a long-standing experience in the hospitality industry. Through Cox's breadth of products including hospitality network (HIN), the #1 advanced interactive video-on-demand and high-speed internet service in use by the leisure gaming industry, you can provide your guests and patrons with the latest and most advanced services. In addition to a full suite of in-room services Cox also delivers advanced business solutions to your property. For dedicated access and transport services geared to you operate more efficiently. All backed by our nationwide, next generation network, you are assured the most advanced solutions available for the hospitality industry today.

Hospitality ONE Complete Solution for the Hospitality Industry

The Simple Facts
• High-speed Internet access for guest room and public areas
• Dedicated end user technical support
• Low/no operational impact

Comcast Hospitality ONE offers ONE solution, at ONE flat rate, on ONE network, all from ONE full-service provider.

Resource Center

Username
Password
I Remember me
Login

Lost your password?
For access to additional tools and

Sound like a lot? It's what you should expect. Comcast, the country's leading cable and broadband communications provider, leverages existing in room infrastructure to provide high-speed internet access to guest rooms and meeting rooms via a wired solution with wireless access available in hotel public spaces.

Installation is fast and cost effective. In addition to fast, reliable Internet
Sampling of Cable’s Offerings
Business Telephone Systems:
Building Wiring, Network Connections, and Premises Telephone Systems
In the Beginning …

Everything was voice.
Voice Business Systems

History

5 Generations of Customer Premises Telephony Systems

• Vintage Cordboard
• Analog
• Digital
• Integrated Digital Voice/Data
• IP-based
## Key Systems vs. PBX

<table>
<thead>
<tr>
<th>PBX</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Big (Typically over 20 stations)</td>
<td>Small (2 – 20 stations)</td>
</tr>
<tr>
<td>Trunks to Network</td>
<td>Lines to Network</td>
</tr>
</tbody>
</table>
History (cont.)

Some (really old) Bell System Analog PBXs:

Progressive Control
701, 740

Common Control
756, 757, 770, 800, 805, 812, 101ESS

Vintage Key Systems
1A, 1A1
History (cont.)

Digital PBX

Dimension, Definity, SL-1, Meridian 1, Rolm CBX

Common Control, Electronic

More Current Key Systems

AT&T Merlin
Nortel Norstar
Avaya Partner
History (cont.)

Integrated Digital Voice/Data PBX

• Time Division Multiplexed (TDM) T-1 trunks
• Shared for voice and data
  • “Nailed-up” 64 Kbps. Channels through PBX

• Shared facility between locations

• Might also simply mean integrated workstations
The Future

IP-Based Business Communications

- Full data/voice integration
- Packet-based
- Usually Ethernet connectivity to outside world
- May still have conventional analog trunk interface
What It Helps to Know

- Signaling (Both sides)
  - Idle state
  - Initiation
  - Active session

- Telephony CPE (What are you connecting to what?)
  - Functions
  - Features

- Cabling and Wire
  - Structured Wiring Systems
  - Connectors
  - Termination
Why Confusion is Easy

Commercial Building Wire Systems
also called
Premises Distribution Systems

Note: Station set is Customer Premises Equipment (CPE), and is NOT part of Premises Distribution System.
At the Demarc: Lines vs. Trunks

- Blurry concept – same physical implementation
- Lines are associated with telephone numbers
- Trunks are shared on a system level
- Trunks have higher usage
- Different ways to signal request for service
Line Off-Hook

Tel Set
Or
KTS

MTA
Loop Start Trunk

PBX

MTA
Ground Start Trunk

- 48 V

PBX

MTA
E & M Two Wire Trunk

- 48 V

PBX off hook

- 48 V

PBX

MTA

MTA off hook

E

M
E & M Four Wire Trunk

PBX off hook

- 48 V

E
SG
M
SB

PBX

- 48 V

MTA off hook

Current Limiter

MTA

PBX off hook
DID PBX Trunk

- 48 V

PBX   MTA
T-1 Trunk

CAS

PBX

MTA
Multi-Line E-MTAs
ARRIS TM508

- Product features:
  - Integrated DOCSIS 2.0 Cable Modem
  - Multiple Protocol Support: PacketCable NCS and SIP (future)
  - Either 8 or 12 Lines of Telephony (RJ-21)
  - Software compatibility and feature parity with existing Touchstone Software Carrier class telephony interface implementation
    - 48V loop voltage, current boost mode
  - Wall mount and rack mount options
  - Enhanced telephony features include dynamic jitter buffers and G.168 compliant echo cancellation
  - RJ45 10/100BaseT high speed data interface
  - Support for external battery backup power with 48V DC power input and telemetry support
  - Supports up to 14 non-blocking simultaneous call events
    - Example: 8 active lines off hook, 6 lines with call features (i.e., 3WC, CW)
TM508
Rear Panel Connectors

- Chassis Ground
- AC Input
- Power Switch
- Reset Switch
- RJ21X – Telephone Line T&R
- 48 VDC Input
- PacketCable 1.1 Telemetry
- Future (non-functional)
- Ethernet Data

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TM512 Front Panel LED

Power Status

DOCSIS Network Status

Telephone Line Provisioning & Hook Status
Key Telephone System Attributes

Key Telephone Systems (KTS)

- Usually have Key Service Unit (KSU)
- Lines only
- Intercom
Key Telephone System

Connectors/Jacks

Twisted Pair

Key Lines 1, 2, & 3

Key Service Unit (KSU)

Lines 1 2 3
Key Telephone System Block Diagram

- Admin
- Maintenance
- Power
- Prog. Store
- Call Store
- Central Computer Control
- Switching Matrix
- Line Ports
- To Station Sets
- To Service Provider Network

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KSU-less Key System

- Each station set has full processing ability
- Accessible lines wired directly to each set
- All sets have at least one line in common with another set
Private Branch Exchange (PBX)
Circuit Switched PBX
Typical Cabinet Hardware

- Power
- Carriers, Shelves
- Common Control and Memory
- Port Cards
- Special Shared Cards
  - Touch Tone Receivers
  - TT Dialing Senders
  - Ring Generators
  - Data Call Setup Cards
  - Tone Generators
PBX Design
Capacity Issues

CCS Capability
Mix of Lines/Trunks
Universal Ports
Feature Mix and Usage
Call Duration
Processor Size (MIPS)
Timeslots
Current Technology: IP PBX

To Station Sets

Line Ports

Admin | Maintenance | Power

Trunk and Data Ports

Feature Server

Softswitch

Media Gateway

Signaling Gateway

To Service Provider Network
Why You Need to Know Datacom as Well as Voice

These are Key Systems and PBXs!

![Diagram of datacom and voice systems]
## PBX vs. Key System

<table>
<thead>
<tr>
<th>Feature</th>
<th>PBX</th>
<th>KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tel Sets</td>
<td>Simple</td>
<td>Complex</td>
</tr>
<tr>
<td>Network Access</td>
<td>Dial 9</td>
<td>Direct Selection</td>
</tr>
<tr>
<td>Size</td>
<td>Large</td>
<td>Less than 20 Stations</td>
</tr>
<tr>
<td>Predominant Calling</td>
<td>Between Office Users</td>
<td>Outside Calls</td>
</tr>
<tr>
<td>Intercom</td>
<td>Many Paths</td>
<td>Few Paths</td>
</tr>
</tbody>
</table>
Centrex and Hosted PBX

• Share part of a network-based switch
• Centrex is typically circuit switched, TDM technology
• Hosted PBX is typically an IP-based service
• All features come from the network-based switch
• Subscriber buys on a “per line” basis
CPE Features

Why you need to know CPE features

That light wasn’t blinking before!
Feature Classes

- System
- Attendant
- Management

PBX
- PBX and Key
System Features - Standard

• Automated Attendant
• Automatic Program Reloading
• Automatic Route Selection
• Automatic Station Release with Howler
• Call Forwarding Busy Line
• Call Forwarding No Answer
• Call Forwarding - Remote
• Call Forwarding - Private Facilities
System Features - Optional

- Automatic Call Distribution
- Autovon Access
- Call Number Buffering
- DC Power
- Direct Inward Dialing
- Direct Inward System Access (DISA)
- Direct Outward Dialing
- Distinctive Ringing
- End to End DTMF Signalling
- Flexible Hunting Arrangements
- Flexible Intercept
- Flexible Release
System Features – Optional Continued

• Flexible Station Restrictions
• Hot Standby
• Off-Premises Stations
• Power Failure Cut-Through
• Reserve Power
• Special Circuit Interface
• Speed Calling: System
• Ten Digit Telephone Number Restriction
• Tenant Service
• Time of Day Routing
• Uniform Call Distribution
Attendant Features

- Alphanumeric Display
- Attendant Abbreviated Dialing
- Attendant Assisted Dialing
- Attendant Controlled Conference
- Automatic Recall
- Busy Override
- Calling Number Identification
- Call Processing Indications
- Call Waiting Indications
- Camp-On Busy
Attendant Features - Continued

- Centralized Attendant Service
- Console Headsets
- Console Signal Volume Control
- Dial 0 Access to Attendant
- Direct Trunk Group Selection
- Flexible Night Service
- Individual Trunk Access
- Locked Loop Operation
- Loop Transfer
- Message Center Service
- Multiple Console Operation
Attendant Features
Continued Some More

• Position Busy
• Station Busy Verification
• Switched Loop Operation
• Trunk Group Busy Lamps
• Two Way Splitting
Management Features

- Account Code
- Authorization Code
- Automatic Circuit Assurance
- Call Accounting
- Diagnostic and Maintenance Programs
- Feature Usage Monitoring
- Line Load Control
- Line, Trunk, and Network Testing
- Maintenance Busy
- Malicious Call Trace
- System Administration and Control
- System Alarm Indication
- Remote Diagnostics and Maintenance
- Traffic Measurement
Station Features
(Also Pertain to Key Systems)

• Add-On Conference
• Automatic Callback
• Automatic Re-Ring on Held Call
• Call Forwarding, Variable
• Call Hold
• Call Park
• Call Transfer
• Call Transfer via Camp-On
• Call Waiting
• Cancel Call Waiting
• Classes of Service
• Consultation Hold
• Data Privacy
Station Features - Continued

- Data Terminal Connection
- Dial Call Pickup
- Dial Trunk Transfer
- Dial Intercom
- Directed Call Pickup
- DTMF Dialing
- Executive Override
- Flexible Station Controlled Conference
- Individual Speed Calling
- Last Number Redial
- Malicious Call Trace From Station
Station Features
Continued Some More

- Music on Hold
- Saved Number Redial
- Station Call Waiting
- Station Forced Busy
- Station To Station Calling
Cabling and Connectors

• Premises Distribution System

• Connectors and Jacks
Building Wiring

Commercial Building Wire Systems
also called
Premises Distribution Systems

Note: Station set is Customer Premises Equipment (CPE), and is NOT part of Premises Distribution System
Horizontal Wiring

Two Outlets per Work Area

One outlet: Four pair unshielded twisted pair (UTP)  
(Meets IEEE 802.3 Standard for 10 Base T)

One outlet: Four pair UTP, or  
Two pair shielded twisted pair (STP), or  
Coax  
Last two meet IEEE 802.5 and 802.3 for 10Base2
Some Popular Jacks

RJ-45  
RJ-11  
RJ-21

Jack Bauer
Their Real Names

8P8C

6P2C

RJ-21

Kiefer Sutherland
Inconsistent Pin Assignment

An 8P8C jack can be wired as:

- **USOC RJ**
- **TIA/EIA T568A**
- **TIA/EIA T568B**
## Common Usage RJ-45

<table>
<thead>
<tr>
<th>Pin</th>
<th>Ethernet</th>
<th>EIA/TIA 568A</th>
<th>EIA/TIA 568B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transmit+</td>
<td>White with green stripe</td>
<td>White with orange stripe</td>
</tr>
<tr>
<td>2</td>
<td>Transmit-</td>
<td>Green with white stripe or solid green</td>
<td>Orange with white stripe or solid orange</td>
</tr>
<tr>
<td>3</td>
<td>Receive+</td>
<td>White with orange stripe</td>
<td>White with green stripe</td>
</tr>
<tr>
<td>4</td>
<td>Not used</td>
<td>Blue with white stripe or solid blue</td>
<td>Blue with white stripe or solid blue</td>
</tr>
<tr>
<td>5</td>
<td>Not used</td>
<td>White with blue stripe</td>
<td>White with blue stripe</td>
</tr>
<tr>
<td>6</td>
<td>Receive-</td>
<td>Orange with white stripe or solid orange</td>
<td>Green with white stripe or solid green</td>
</tr>
<tr>
<td>7</td>
<td>Not used</td>
<td>White with brown stripe or solid brown</td>
<td>White with brown stripe or solid brown</td>
</tr>
<tr>
<td>8</td>
<td>Not used</td>
<td>Brown with white stripe or solid brown</td>
<td>Brown with white stripe or solid brown</td>
</tr>
</tbody>
</table>
## Common Usage RJ-11

<table>
<thead>
<tr>
<th>“real” RJ</th>
<th>RJ25</th>
<th>RJ14</th>
<th>RJ11</th>
<th>Pair</th>
<th>T/R</th>
<th>+/-</th>
<th>New color</th>
<th>Old color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>X</td>
<td></td>
<td></td>
<td>3</td>
<td>T</td>
<td>+</td>
<td>White/Green</td>
<td>Orange</td>
</tr>
<tr>
<td>2</td>
<td>X</td>
<td>X</td>
<td></td>
<td>2</td>
<td>T</td>
<td>+</td>
<td>White/orange</td>
<td>Black</td>
</tr>
<tr>
<td>3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>1</td>
<td>R</td>
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<td>Blue</td>
<td>Red</td>
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<tr>
<td>4</td>
<td>X</td>
<td>X</td>
<td>x</td>
<td>1</td>
<td>T</td>
<td>+</td>
<td>White/blue</td>
<td>Green</td>
</tr>
<tr>
<td>5</td>
<td>X</td>
<td>x</td>
<td></td>
<td>2</td>
<td>R</td>
<td>-</td>
<td>Orange</td>
<td>Yellow</td>
</tr>
<tr>
<td>6</td>
<td>x</td>
<td></td>
<td></td>
<td>3</td>
<td>R</td>
<td>-</td>
<td>Green</td>
<td>Blue</td>
</tr>
</tbody>
</table>
RJ-21 Connector

Pin 1
Pin 25
Pin 26
Pin 50
RJ-21 Pin Layout

RJ21X Standard Telco Cable Pinout

Band Colors

Pair Colors

4 Pair Color Code

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Telephony Punch Block Kit

- (1) Bridging clips (Qty 24)
- (2) Pre-wired Network 66-block with cover
- (3) RJ21X cable
66 Connector Block

With RJ-21 Connector
Connection to 66 Block

Velcro Strap
Connection Retention
Telephony Subscriber Connections

Bridging Clips – Install to Bridge Network to Subscriber

Line 1 - Tip
Line 1 - Ring
Line 2 - Tip
Line 2 - Ring

Punch Down Subscriber Side T&R Connections

Network Side
Subscriber Side
110 Connector Block
Questions and More Info

For further information on Business Communications Systems and Commercial Services, please contact:

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