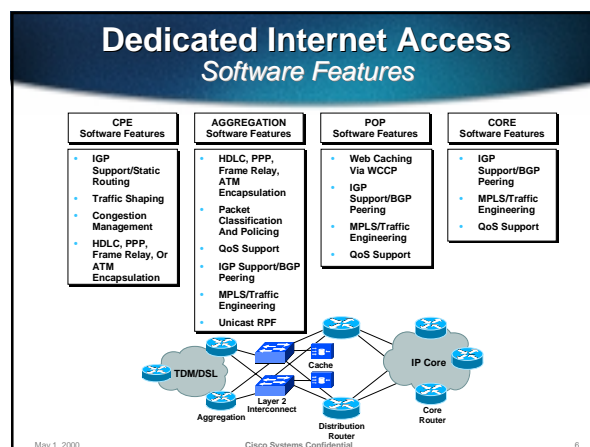
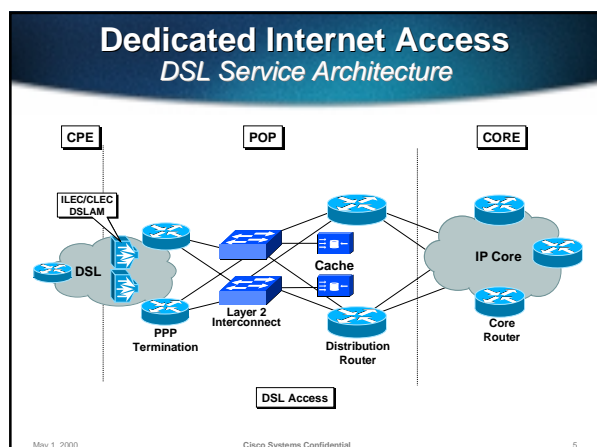
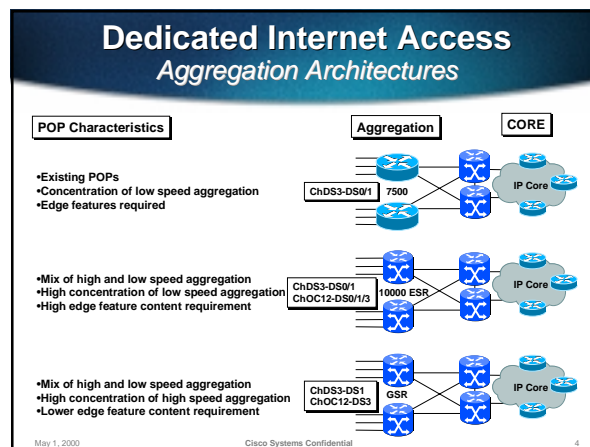
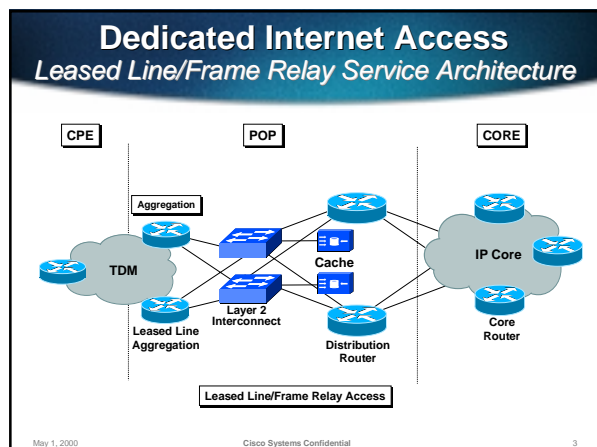


## Customers

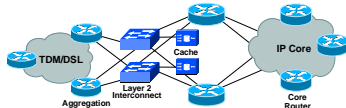
- Define “us” or “them”
- A domain (us.com, them.gov)?
- An autonomous system?
- Administrative boundaries and controls

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## Dedicated Internet Access Hardware Features

CPE Hardware Features	AGGREGATION Hardware Features	POP Hardware Features	CORE Hardware Features
<ul style="list-style-type: none"> <li>Flexible LAN/WAN configurations</li> <li>Encryption (3600/7200)</li> </ul>	<ul style="list-style-type: none"> <li>Channelized Interfaces</li> <li>E3, DS-3, OC-3/12 Interfaces</li> <li>QoS Support</li> <li>NEBS/Redundancy</li> </ul>	<ul style="list-style-type: none"> <li>QoS Support</li> <li>Redundancy/NEBS</li> </ul>	<ul style="list-style-type: none"> <li>IGP Support/BGP Peering</li> <li>MPLS/Traffic Engineering</li> <li>QoS Support</li> </ul>



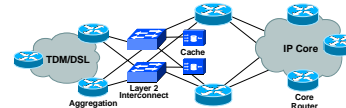
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## Dedicated Internet Access Product Options

Cisco CPE Product Options	Cisco AGGREGATION Product Options	Cisco POP Product Options	Cisco CORE Product Options
<ul style="list-style-type: none"> <li>675</li> <li>1600</li> <li>1720</li> <li>2600</li> <li>3600</li> <li>7200</li> </ul>	<ul style="list-style-type: none"> <li>2600</li> <li>3600</li> <li>6400</li> <li>7200</li> <li>7500</li> <li>MGX 8850</li> <li>10000</li> <li>Cat 6000 OSR</li> </ul>	<ul style="list-style-type: none"> <li>2600</li> <li>3600</li> <li>Catalyst 6000</li> <li>7200</li> <li>7500</li> <li>GSR</li> <li>MGX 8220</li> <li>UCP</li> </ul>	<ul style="list-style-type: none"> <li>3600</li> <li>7200</li> <li>7500</li> <li>GSR</li> <li>BPX 8650</li> <li>MGX 8850</li> </ul>



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## Scaling Lease Line POPs

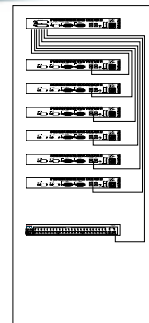
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## Stack and Rack

- Model for scaling lease line growth based on revenue growth.
- Get a Cisco 2522 (2 high speed serial & 8 low speed serial)
  - ✓ Fill up 6 ports, taking in the revenue, use the revenue to buy the next 2522.
  - ✓ Keep on stacking ...

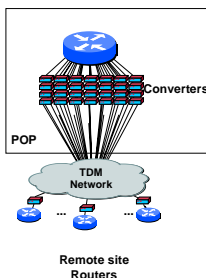


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## Problem: Growth



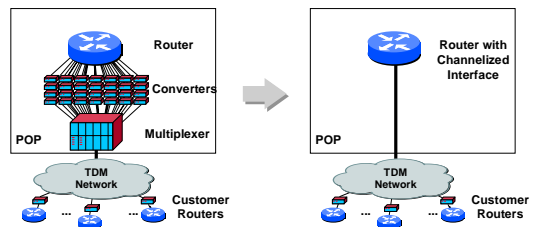
- Rack Space
- Provisioning of new customers
- Cabling Complexity
- Management of converters
- Cost
- Uplink bottleneck
  - ✓ Bandwidth
  - ✓ Number of uplinks
- Port density limits
  - ✓ Low router slot utilization
- Difficult Service management
- Problematic QoS
- Configuration inflexibility

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## Channelized Interface Solutions

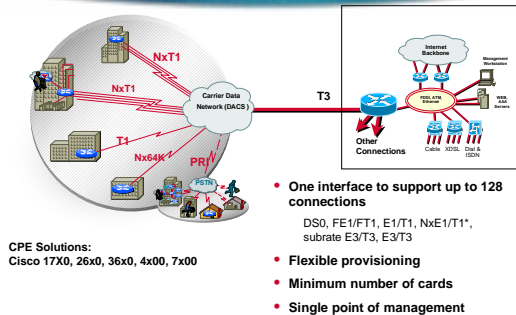


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## Multi-Level Channelization



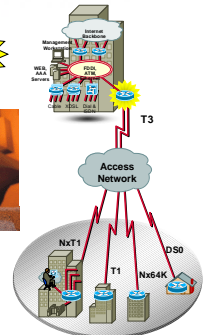
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## 1 & 2 Port Multichannel T3

- Full range of connectivity on one interface
  - DS0, NxDS0, FT1, T1, NxT1, subrate DS3, full rate DS3
  - 28 T1s per T3
  - 16 E1s per E3
  - Up to 128 connections per T3
- Full interoperability
  - Digital Link, Larscom, Kentrox simultaneous subrate and scrambling support
- Direct termination
  - Built in T3/E3 Line Interface
- Single wide PA for Cisco 7500 and 7200
- Cisco IOS 12.0T, 12.0S



## How Telcos can Leverage Lease Line Aggregation

- If Telcos know that ISPs are going to have a lot of lease lines coming to one location, then proactive planning will keep the Telco's cost down.
  - Co-Locate the DACS (Digital Access and Cross-connect System) with the ISP's Operations Center.

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## Dedicated Internet Access Technologies and Products

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## Low End Lease Line Aggregation

- Maximum investment protection, scalability, and flexibility
  - Five major platform groups
  - Over 70 shared NMs, WAN interface cards, voice interface cards, and AIMS
- Broadest multiservice capability in the industry
  - Data, voice, video, dial, VPN, and ATM edge integration



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## Cisco 2522 - Low Cost Lease Line Aggregation

- 1 Ethernet (AUI/10BT)
- 2 High-speed synchronous serial
- 1 ISDN BRI S/T interface
- 8 Low-speed (115.2 kpps) asynchronous/synchronous serial (5-in-1)



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## Modular Access Router Family

- 50–70 kpps fast switching
- 3–4 kpps process switching
- Four network module slots
- 25–40 kpps fast switching
- 1.5–2 kpps process switching
- Two network module slots
- 12–25 kpps fast switching
- LAN interfaces integrated
- One network module slot

Versatility  
Integration  
Performance



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## Cisco 2600 Series: Versatility, Integration, Power



- Data, voice, dial, and VPN access
- Ethernet, Fast Ethernet, Token Ring, and mixed-LAN models
- Full Cisco IOS software support
- Field-upgradable interfaces shared with Cisco 1600, 1700, and 3600 series

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## Cisco 3660

- Higher performance  
100 to 120 kpps  
(Cisco 3640: 50 to 70 kpps)
- Higher density: six slots
- Higher level of integration  
One or two Fast Ethernet ports  
Two Advanced Integration Module (AIM) slots  
Console port, aux port, dual PCMCIA card slots, dry contact closure
- Higher availability  
Dual power (dual AC, dual DC, or AC and DC)  
Hot-swap like-like network modules  
Hot-swap power supplies



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## Cisco 3660 Mechanical Design

- Designed for mission-critical applications
- Designed for maximum uptime
- Designed for easier serviceability
- All components are field replaceable  
Motherboard  
Backplane  
Fan tray  
Power supply



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## Cisco 7200

### LAN

- 1 Fast Ethernet (TX/FX)
- 2 Fast Ethernet (TX/FX)
- 4 and 8 Ethernet (10BaseT)
- 5 Ethernet (10BaseFL)
- 4 Token Ring (HDQ/FDX)
- 1 FDDI (HDX and FDX)
- 1 100VG
- 1 ATM OC-3
- 1 EtherSwitch (12E/2FE)
- Gigabit Ethernet

### WAN

- 4 and 8 Serial
- 4 E1 G.703
- 1 and 2 HSSI
- 4 and 8 BRI
- 1 ATM-CES
- 1 ATM (DS-3/E3)
- DPT-OC12
- 1 Multichannel T3/E3
- 1 Channelized T3
- 4 and 8 Multichannel T1/E1
- 2 PRI/Channelized T1/E1
- 1 Packet-over-SONET
- 1 Channel (ESCON, Parallel)
- 1 and 2 T3/E3 with Integrated CSU/DSU

### Multiservice

- Digital Voice Port
- Adapters
- ATM BBA



### L3 Services

- Integrated Service Adapter
- Compression
- Encryption

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## Cisco 7500 Series

Today

Capabilities	7505	7507	7513	7576
Routers / Chassis	1	1	1	2
Chassis / Rack	3	2	2	2
Bandwidth	1.0 GB/s	2.0 GB/s	2.0 GB/s	4.0 GB/s
Chassis Slots	5	7	13	13
Interface slots	4	5	11	11
Max. processors*	1	2	2	2
Max. power supplies	1	2	2	2

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