

• NETWORKERS

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# Plug-and-Play Configuration of Cisco Devices

Session NCM-102

## Agenda

- **Network Deployments Today**
- **Industry Initiatives**
- **Case Study**

# Congratulations!

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**You've Just Been Promoted to  
Deploy and Manage the Entire Network  
for the Western Region...**

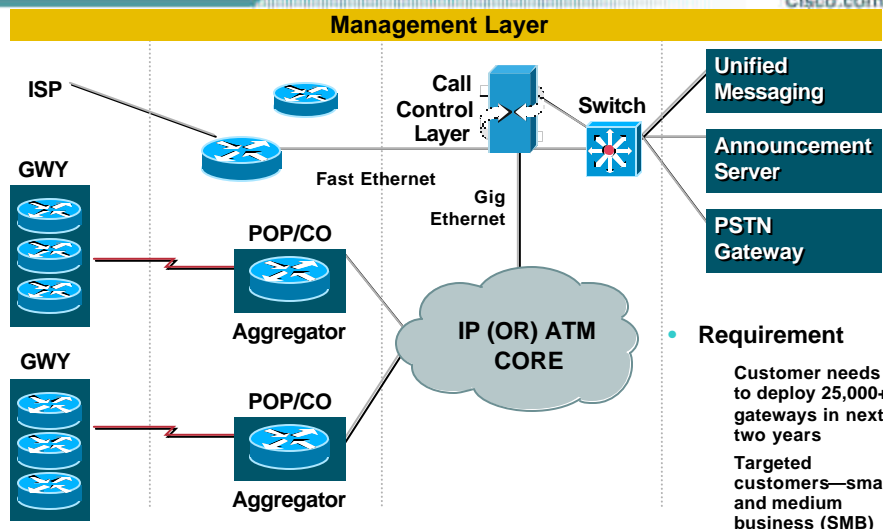


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# Network X

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# Configuration Process Today

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- Order
  - CSR
  - E-mail
  - Web
- Manufacturing
- Shipping
  - Warehouse
  - Subscriber
- Configuration
  - Provisioning/staging
  - Testing
  - Repacking
  - Shipping
  - Installation

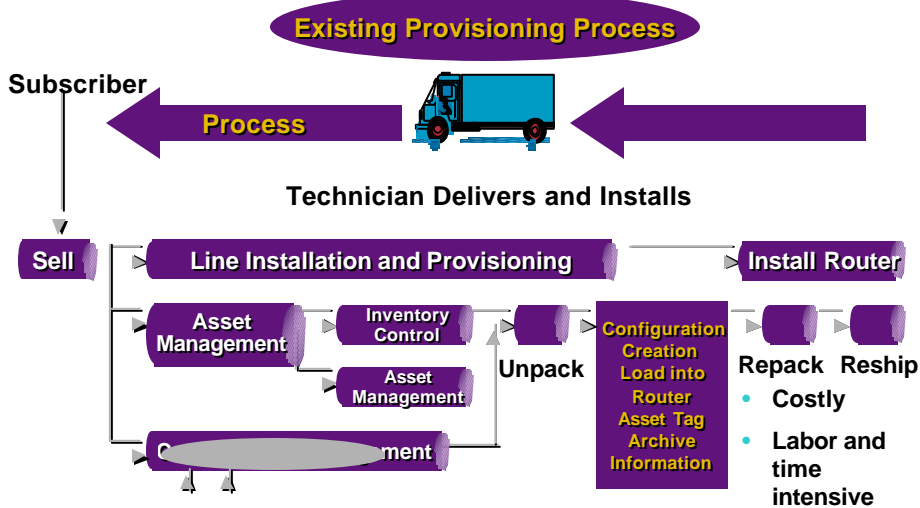


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# Deployment Today

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# Solutions Offered by Equipment Vendors

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- Order
  - CSR
  - Email
  - Web
- Manufacturing
  - Custom CPE
  - Testing
  - Documentation
- Shipping
  - Subscriber

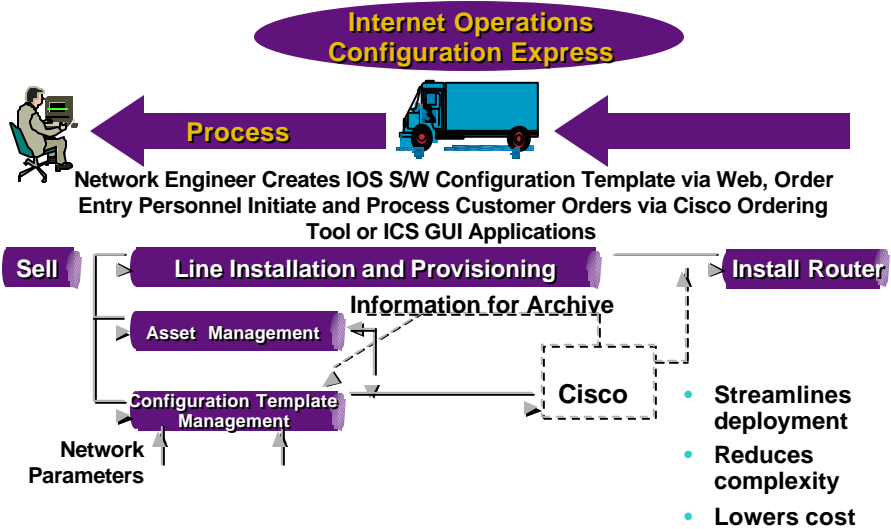


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# Customized Configuration

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## Limitations of Custom Configuration

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- Additional cost incurred by network equipment vendor
- Equipment vendors require a solution where custom configuration of CPE devices is not required
- Need to re-configure CPE if customer discontinues subscription before installation
- Service delay, if CPE is shipped to an incorrect address
- Need to re-configure in case of CPE failure
- Customer specific information may not be available ahead of shipping
- Cannot maintain inventory

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## Agenda

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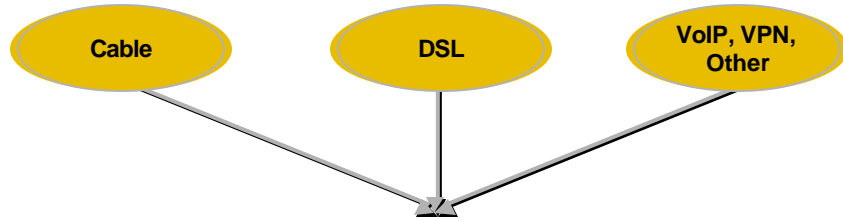
- Network Deployments Today
- **Industry Initiatives**
- Case Study

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# Technology

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## Business Challenges

- Time to market
- High rollout cost
- Customer retention
- Provisioning services
- Hiring skilled technicians

## Operational Challenges

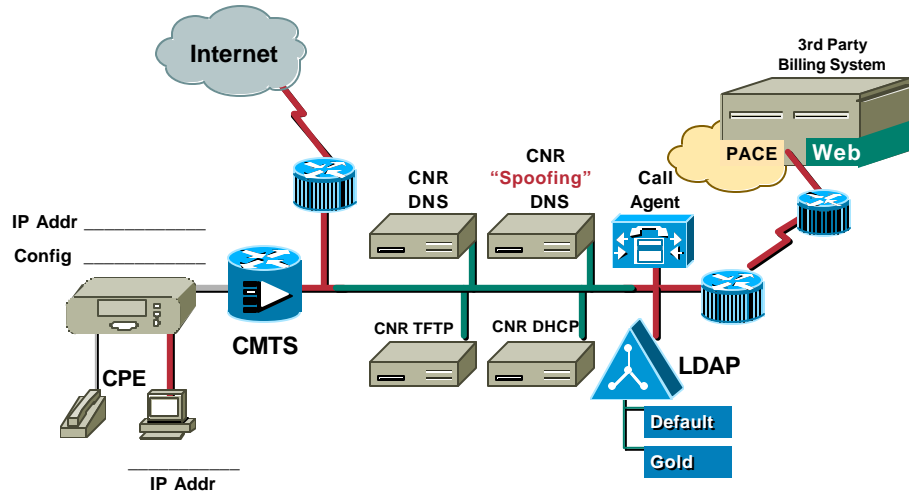
- "Hands free" deployment
- Long wait time
- multiple truck rolls
- Trouble resolution
- Circuit + packet world

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# Cable Network Architecture

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## DOCSIS SOLUTION

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### Data Over Cable Service Interface Specifications (DOCSIS)

- International standards-based (802, ITU-J83, J112, IETF) system for operating data/voice/video modem over HFC cable plants
- Ensure interoperability and security between cable modem and Cable Modem Terminating Systems (CMTS)
- Multi-vendor CMTS and Cable modem support
- Specifies file format and parameters for configuring cable modems
- Current version 1.1 extends specifications to include VoIP features and QoS between cable modem and CMTS
- TFTP server to generate DOCSIS configuration file

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## DOCSIS Cable Modem Boot Process

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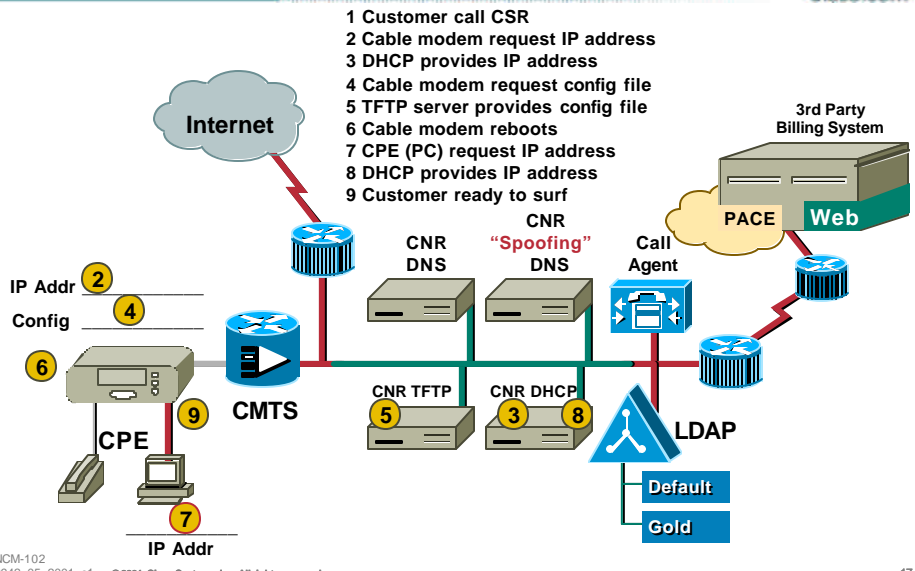
- Ranging—Find an up/down stream frequency for initial configuration
- DHCP—Obtain IP address, gateway, subnet mask and location for configuration file
- TFTP—Obtain essential modem configuration info
- S/W update—Option to download to new software image using TFTP
- Registration—Register cable modem with CMTS
- Privacy—Authenticate the baseline privacy key pair

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# Cable Network Architecture

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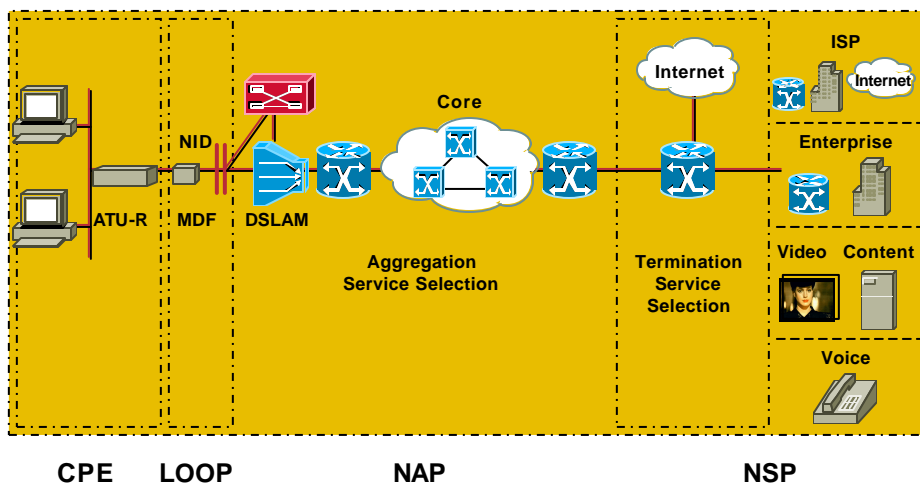
# DSL

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## DSL Subscriber Provisioning

## DSL Network Architecture

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## Open DSL Solution

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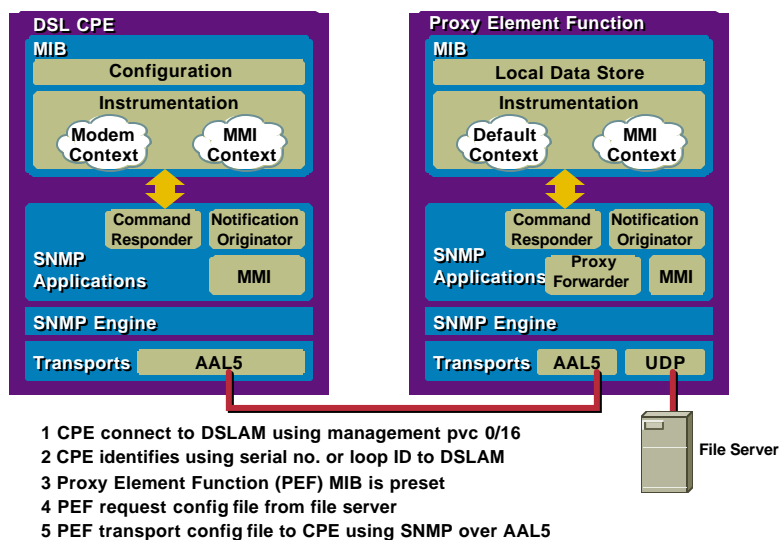
- **OpenDSL comprises collaboration of DSL network equipment vendors, chip manufacturers, system integrators and service providers; features and benefits include**
  - Open standards
  - Auto-configurable CPE
  - Pre-certification testing
  - OpenDSL equipment and application certification
- **Proxy element support from DSLAM or aggregation router**
- **Software image download**
- **SNMPv3 over AAL5 for transport**
- **MMI uses VPI/VCI of 0/16 between CPE and proxy element**

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## DSL Subscriber Provisioning

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## Limitations of the Solutions

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- Industry initiatives address only subscriber provisioning for Cable and DSL space
- Other technology space that needs attention include
  - VoIP
  - Managed services
  - VPN
  - Frame Relay, ISDN services
  - Network core provisioning
- Solution to deploy and manage converged Circuit + Packet network; number of devices expected to grow from 1000 to 100,000 to millions

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## Managing Large Networks

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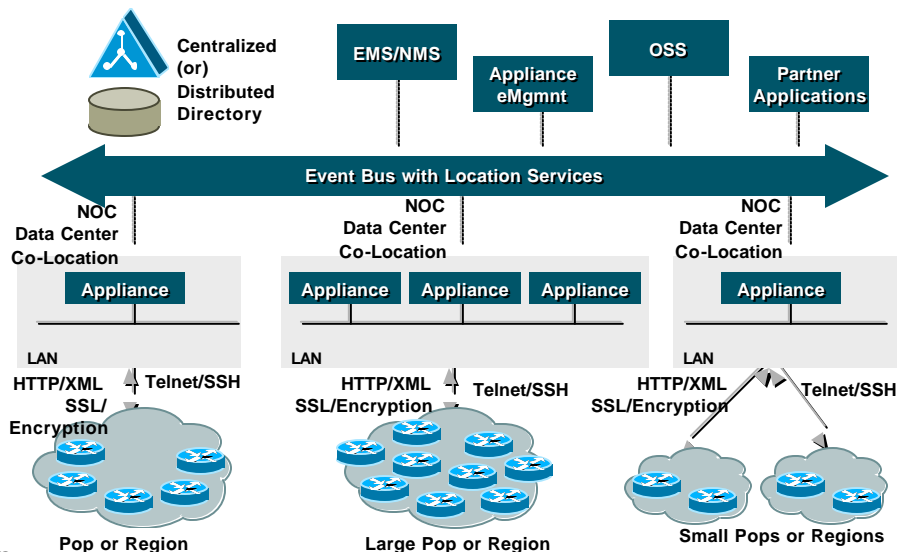
- Network equipment vendors should design and build their devices intelligent than totally relying on OSS
- Network intelligence distributed across and closer to the network rather than centralized architecture
- Shift in network management paradigm by moving away from polling the network elements
- Network level management rather than device level
- Focus on communicating to multiple devices than to individual devices using Telnet, Telnet, Telnet, Telnet...

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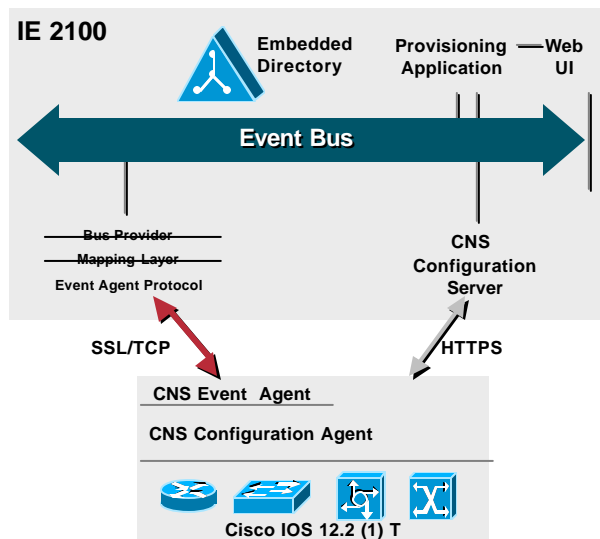
## Intelligence into the Network

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# Appliance Architecture

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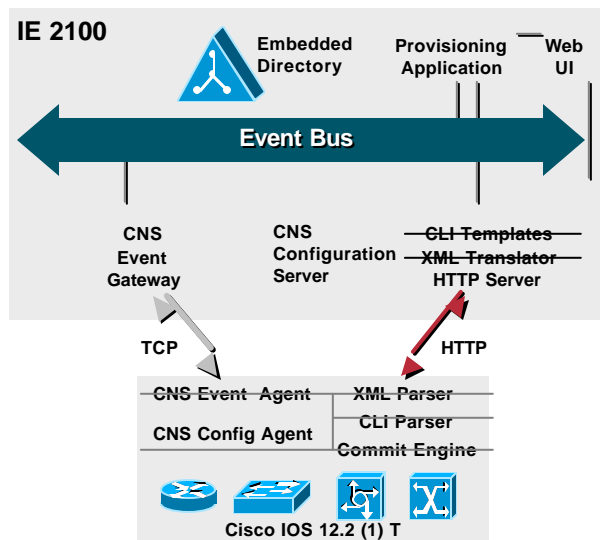


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# Appliance Architecture

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# XML for the CLI

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## XML DTD for Configuration Data

```
<!ELEMENT config-data (config-id, error-info?, cli*)>
<!ELEMENT error-info (line-number?, error-message)>
<!ELEMENT config-id (#PCDATA)>
<!ELEMENT error-message (#PCDATA)>
<!ELEMENT line-number (#PCDATA)>
<!ELEMENT cli (#PCDATA)>
```

**XML DATA**

```
<config-data>
  <config-id> Router1-123abc </config-id>
  <cli> interface FastEthernet 1 </cli>
  <cli> ip address 10.10.10.1 </cli>
</config-data>
```

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# Config XML Formats (Examples)

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```
<config>
  <cli> Hostname router </cli>
  <cli> enable password XYZ</cli>
</config>
```

Payload of IOS  
Configuration From CNS  
Configuration Server

**cisco.cns.config.failure**

```
<config-failure>
  <identifier> OSIRIS-030500-1330 </identifier>
  <config-id> Router1-030500 </config-id>
  <error-info>
    <line-number> 1 </line-number>
    <error-message> Incomplete command </error-message>
  </error-info>
</config-failure>
```

IOS Device Sends Event Notifying  
of Configuration Failure

**cisco.cns.config.load**

```
<config-server config-action="read", no-syntax-check="FALSE">
  <identifier> OSIRIS-030500-1330 </identifier>
  <server-info>
    <ip-address> 1.2.3.4 </ipaddress>
    <web-page> osiris/config.asp </web-page>
  </server-info>
</config-server>
```

Configuration Server Sends Event to IOS  
Device Commanding It to Http Get  
Configuration From IP Address 1.2.3.4

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## Agenda

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- Network Deployments Today
- Industry Initiatives
- **Case Study**

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## Case Study 1

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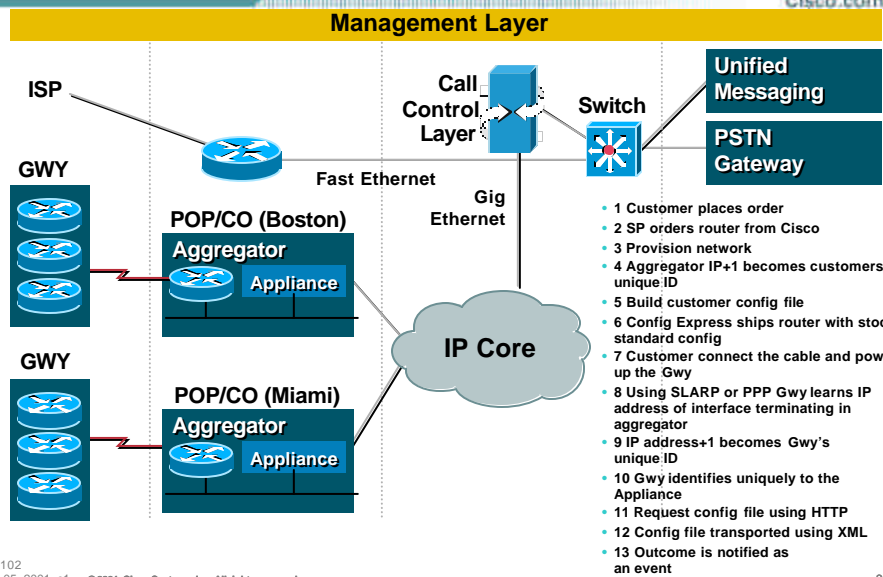
- **Greenfield next generation communication provider offering data/voice/video services; the operational challenge is to deploy 25,000+ Gateways to their SMB customers**
- **Key customer requirements are**
  - CPE should be shipped directly from the manufacturer to their customer**
  - CPE should not carry any device specific information**
  - Power up, CPE should resolve its identity, download device specific information and self-configure**
  - When truck roll is necessary, it should not require a highly skilled technician to install**

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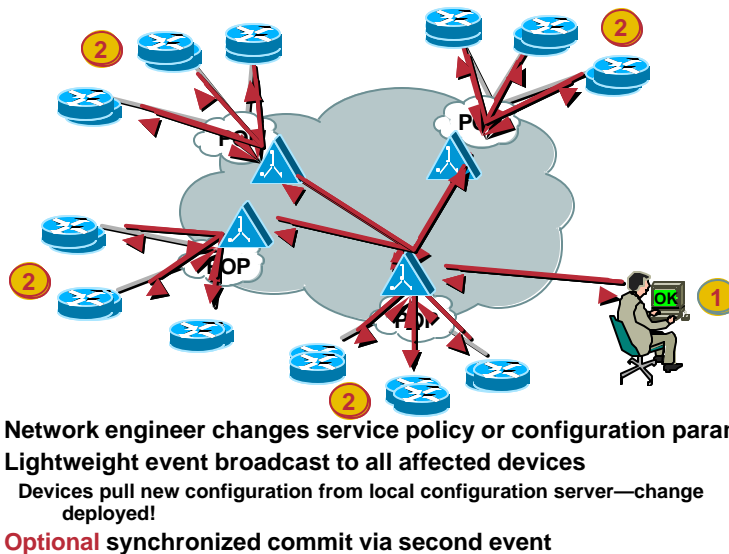
# Customer Network

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# Mass Re-Configuration

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## Documentation URL

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- <http://www.cisco.com/go/cable>
- <http://www.cablemodem.com>
- <http://www.cisco.com/go/dsl>
- <http://www.opensl.org>
- <http://www.cisco.com/go/oss>

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## Summary

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- Complexities in large scale network deployment
- Business and operational challenges
- Industry initiatives for Cable subscriber provisioning
- Industry initiatives for DSL subscriber provisioning
- XML-based programmatic interface
- Publish/subscribe technology to communicate to multiple network devices
- Scaling to deploy and manage large scale networks
- Case study

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# Plug-and-Play Configuration of Cisco Devices

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# Please Complete Your Evaluation Form

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