Cisco OSS Solution for Fulfillment of ETTx + IP VPN Services

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Agenda

- Fulfilment defined
- Services:
  - ETTx based access
  - IP VPN service
- Products:
  - VPNSC
  - IE2100
  - Axiom AxiOSS
- Solution + Demo scenario
Fulfilment is a key process

Market Analysis
Service Definition

Network
Process & People
Marketing & Sales
Support Systems

Service Creation

Service Delivery Processes
Service Fulfilment
Service Assurance
Service Billing
Fulfilment

- **Commissioning/Deployment** = installing new piece of equipment in the network and installing necessary configuration
- **Provisioning/Activation** = modifying the configuration to give a user service
- **Inventory** = assigning network resources, keeping track of what equipment is in use, what service for which user, etc.
- **Workflow** = controlling the logical order of tasks to move a customer order into a service
Services

What are we going to provision
ETTx used as access technology

• To deliver very high speed multimedia communication capabilities for both business and residential customers

• Data/Voice/Video integration on top of the unified IP infrastructure

• Business customers:
  Fast Internet, VoIP, LAN-to-LAN (VPN) and application hosting

• Residential customers:
  Fast Internet, VoIP, Unicast and Multicast Video (from 800kbps to 10 Mbps)
ETTx Metropolitan Architecture – Business / Residential

Primary PoP
- Cisco 12016 GSR
- Catalyst 6500 L2
- Catalyst 6500 L3

Secondary PoP
- Edge IP Ring
- Catalyst 3508XL
- Catalyst 3512

Residential Customers

Business Customers
- Cisco 2621/3640/7200 PBX
ETTB BUSINESS specific requirements

- Transparent LAN support
- Limited end to end STP hops
- Rate limiting
- Layer 2 QoS
- VPN support – MPLS / IP Sec / other
- VLAN to VPN mapping
- Service Provisioning
What is L2VPN

- L2VPN provides end-to-end layer 2 connection to an office in London and an office in Paris over an MPLS core

  It can be Ether, FR, ATM, PoS, HDLC, PPP… (“ATOM” - Any Transport Over MPLS)

  It is for layer 2 connectivity only, layer 3 is transparent to MPLS core: layer 3 can be IPX, etc and no routing is involved with MPLS core
IP VPN Services and Architectures

<table>
<thead>
<tr>
<th>Service</th>
<th>Architectures</th>
<th>Technologies</th>
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<td>-Client–Initiated</td>
<td>L2F/L2TP, IPSec</td>
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<td>-NAS–Initiated</td>
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<tr>
<td></td>
<td>-MPLS based</td>
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<td>Intranet VPN</td>
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Services on top of IP VPN

- VoIP: IP QoS
- Video Streaming: IP QoS, IP Mcast
- Managed Security: NAT, ACL, PIX
- Content networking
- ASP
Products

Building blocks of the solution
IP VPN services
VPN Solution Center

Legacy OSS/BML/ISV

MPLS VPN Mgmt
IPsec VPN Mgmt
L2VPN Mgmt

Service Provisioning
Service aware
SLA
Service Aware Usage

VPN Solution Center

VPNSC2.1 today
Available in VPNSC3.0
Oct2002
MPLS VPN Features at a Glance

- LAN-to-LAN and remote access into MPLS VPN
- Hub-and-spoke and full mesh MPLS/VPN
- VPN-aware fault management
- QoS policy configuration with Smart Template Manager
- VPN aware SLA management
- VPN aware usage measurement and billing
- Open and extensible interfaces for B&OSS integration
IPSec VPN Features at a Glance

- Provisioning and service activation for LAN-to-LAN and remote access IPSec VPN (3K)
- Hub-and-spoke, full mesh and partial mesh topology automation
- Cisco IOS® FW and PIX FW management
- Security Policy Management
- Preshared key generation
- IKE proposal mgmt
- IPSec proposal mgmt
- Static route provisioning between sites
- Routing and IPSec over GRE tunnels
Auditing

• Audit Configuration
  Verify IOS commands provisioned

• Audit Routing
  Verify the CE routes are advertised between VPN sites (MPLS Only)
Topology View of VPNs

- IPSec CPE to CPE Tunnel Views
- MPLS/VPN PE and CE Views
- MPLS/VPN CE to CE Views
Template Provisioning System

- Allows flexible and smart provisioning of any IOS commands

- Components
  - Template Manager GUI
  - Template API

- Template Definition language
  - Rich set of data types and expressions
  - Dimensional arrays, strings, float, more..
  - Tied to VPNSC VPN Service Request
VPNSC OSS Interfaces

- Complete Corba API’s for IPSec and MPLS/VPN Provisioning
- VPN aware SLA data
- Accounting API’s (MPLS Only)
- Task Manager (scheduling)
- Events API
  - Corba Event Gateway &Tibco bus Events
  - SLA, Mib Data available in XML Format
  - XML interface for easy import and export of data to VPNSC Repository
Cisco Info Center Fault VPN Correlation

- CIC accesses the Repository of VPNSC and retrieves the VPN data
- CIC maps interfaces to VPNs and VPN subscribers
- CIC provides events at a VPN service level by identifying the impacted MPLS VPNs, end users and services
- Future Releases will include:
  - IPSec VPN fault and Service Service Assurance by correlation using SAA for SLA violations
VPNSC Enabled L2VPN Services

- Transparent LAN over MPLS or IP Network
- Ethernet To Home
- Ethernet To Buildings
- Like-to-Like AToM/L2TPv3 Lease Line Service
- Any-to-Any AToM/L2TPv3 Lease Line Service
# VPNSC Product Roadmap

## 2.0
- Provisioning
  - LAN-to-LAN IPsec VPN provisioning
  - Multiple download gateway engine
  - Smart template provisioning engine for IPv4, QoS, FW... provisioning
- High availability solution for customers
- Journaling of database and playback
- CE staging with VPNSC
- SSH and SNMPv3 support
- Exec command and download console
- Auto provisioning of SAA probes with IPsec VPN service request

**Status:** GA

## 2.1
- Provisioning
  - VPN3K concentrator support for remote access VPN and IPsec Lan2Lan VPN
  - VPN3K to IOS device IPsec networking
  - PIX firewall provisioning
- EoMPLS for 7600
- DSLAM as a PE support
- Inter-AS VPN support
- Sun clustering 3.0

**Status:** FCS

## 2.2
- Ease of Use MPLS/VPN GUI
- Alternate RD allocation schemes

**Status:** Planned

## 3.0
- VPN Provisioning
  - Traffic Engineering
  - Policy based QoS
  - Event based provisioning
  - Integrated end-to-end provisioning process
  - ATOM
  - L2TPv3
  - Carrier Carriers
  - VPN Aware Route Reflector
  - FW management
- Web-based VPN console
- Distributed architecture
- Highly scalable solution
- User model with multiple levels of access
- Smart Templating auditing
- End-to-end audit functionality
- Extended H/W support
- Customer Network Management Views
- CNS/AD Integration
- APIs enhancement

## Q2 CY ’01

## Q4 CY ’01

## Q1 CY ’02

## Q3 CY ’02
Managed IP VPN Services

**VPNSC CNS Integration – Phase 1 VPNSC 2.2**

- **Accept Customer Order**
- **SP enters VPN service intent**
- **Order Cisco CPE**
- **CPE Service PnP**
- **VPN activated upon CPE PnP**

Diagram:
- Cisco Mfg. Config Express
- Order Entry
- VPN Solution Center
- OSS/BSS Message Bus
- Branch Office
- PE
- IP
- Internet
- SOHO
- IE 2100
- PE
- PE
- PE
- Order Entry
- VPN Solution Center
- OSS/BSS Message Bus
- Branch Office
- Branch Office
- Branch Office
VPNSC 2.2 New MPLS GUI

- Ease of use features
- Profiles to describe VPN service
- Profile limits the amount of Operator input to create a VPN
- Import Tool for fast characterization of device information
Cisco ISV partner to extend Cisco VPN Solution Center for Multi-vendor VPN Management

Cisco Systems

Cisco VPN Solutions Center

VPN Provisioning Logic

Generic Transport Layer

Cisco NE

Cisco eco-system partner

Re-branded Cisco VPN Solutions Center Multi-vendor Management Platform

VPN Provisioning Logic

Generic Transport Layer

Cisco NE

Non-Cisco NE

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Planned non-Cisco platform support

- MPLS IP VPN
  - Juniper
  - Unisphere
- IPsec IP VPN
  - Checkpoint
  - Nortel (Shasta and Contivity)
  - Cosine
VPNSC 3.0 Key Feature Support List

- VPNSC3.0 Key Features include:
  - Distributed architecture
  - Web based GUI
  - CNS/AD Integration
  - Role Based Access Control user model support
  - Policy Based Fire Wall management support
  - L2 VPN support (FOO over MPLS)
  - UTI (Universal Transport Interface) support (FOO over IP)
  - And more
Cisco Intelligence Engine 2100 Series

Hands-Free Deployment and Configuration

- **Hands Free** – automated deployment and configuration
- **Immediate Productivity** – task-oriented web GUI and configuration templates enable standard network engineers to be immediately productive with little or no training
- **Immediately Usable** – appliance is immediately usable out of the box with minimal configuration
- **Self Contained** – 1 RU Rack Mountable Hardware
- **OSS Ready** – Cisco IOS XML interface fully workflow-enables Cisco device deployment
Cisco Programmable Network Layer

Driving Intelligence into the Network

- Cisco IOS devices enhanced with intelligent CNS agent technology which provides plug-and-play deployment, synchronized changes to distributed network services and more
- Distributed IE 2100 devices form single communications bus for applications and IOS devices
- Single CNS / IOS XML interface to geographically distributed devices, device groups and network services

Network Applications Using XML Interface

Network Engineer Using GUI Interface

Optional User-controlled Data Repository

Pop or Region
ESR 10000, 7500, 7200, AS5x00

Provider Core
GSR 12000

Customer Premises
3600, 2600, 1700, 800 CPE

IE 2100

Network Engineer
Using GUI Interface

Network Applications
Using XML Interface

Optional User-controlled Data Repository

CNS Publish and Subscribe Interface with Cisco IOS XML
Managed Configuration

*Network-wide Service Scenario*

1. Customer or provider changes service policy or configuration parameter
2. Lightweight event broadcast to all affected devices
   Devices pull new configuration from local configuration server – change deployed!
3. *Optional* synchronized commit via second event
Cisco Programmable Network Layer

Feature Summary

- Embedded CNS agent technology enables Cisco IOS devices to act as intelligent peers in network provisioning and monitoring
- Plug-and-play device configuration and self-registration
- Configuration Express for integrated order-to-deployment solution
- Logically centralized Cisco IOS XML interface to geographically distributed devices and device groups
- Template-based automation of device and network-wide service configurations
- Two-step configuration commit with on-box validation
- Synchronized network configuration across any number of geographically distributed devices
- XML-based interface for easy OSS, workflow or script integration
- Enhance profitability of existing service offerings with functionality such as hands-free deployment
- Cisco / Partner integrations and solutions in the pipeline
- Foundation for self-healing high-availability Adaptive Networks
Cisco/Axiom Relationship

- Axiom part of Cisco Ecosystem
- Joint Demo Centre in the UK
- Joint customers
- VPNSC Dev Partner
- Integration to CIC, VPNSC done
- 1st ISV to trial integration to IE2100
AxiOSS Components

- AXIOSS | O²S
  work instructions
  process
  service history

- AXIOSS IMS
  topology
  network model
  equipment definitions

- AXIOSS SNARe
  element manager
  3rd party activation

- 3rd Party IMS
  O²S may be fully integrated to existing IMS for investment protection

- eCRM
  self service

- Order intake

- Order - to - service

- Billing
Axiom O²S Gantt Screen

Job Selection | Job Details | Activity Details | Notes | Add Activities
---|---|---|---|---
Actual Start | Actual Comp | Planned Start | Planned Comp | TCD
22/03/2001 | | 22/03/2001 | 10/04/2001 | 10/04/2001
Service Id | Order Reference | Project Id | CRD | CDD
77 | 88/1 | 5 | 10/04/2001 | 10/04/2001
Status | Priority | Project Name
Open | Standard | FRANKFURT ROLLCLIT

Activity Sequence | Job To Start By In Days | JOB_VIEW | Reset Baseline | Extend Activities To Diamond | < < Align
---|---|---|---|---|---
Activity | March 2001 | April 2001 | May 2001
1. LOG ORDER | 18/03/2001 | 25/03/2001 | 01/04/2001
2. ALLOCATE | 06/04/2001 | 15/04/2001 | 22/04/2001
3. SEND MODEM TO CUSTOMER | 29/04/2001 | 06/05/2001 | 06/05/2001
4. SEND FAX TO DEUTSCHE TELECOM | | | |
5. RESPONSE FROM DEUTSCHE TELECOM | | | |
6. LINE CHECK | | | |
7. CUSTOMER CONFIRM MODEM | | | |
8. ACTIVATE REDBACK | | | |
9. ACTIVATE AVIDIA | | | |
10. ACTIVATE MODEM AND CUSTOMER | | | |
11. TRIGGER BILLING | | | |
Axiom IMS: Inventory

Modules

- Capacity
  - Service/Video
  - Video Server/ Hard-disk/Segment
  - Location/ Rack/PVC
  - IP Pool/IP-Address Range

- Credit Check
  - Modelling
  - Allocation

Topological View

- Customer
  - Cust-ID
  - Address Parameters
    - Address-det-1
    - Address-det-2

- Video Server
  - Hard-disk
  - Partition
    - Bandwidth
      - Segment 1
      - Segment 2

Object Tree

- IP Pool
  - IP-Range
    - Class Group
    - IP_Address
    - IP-Address

- Location
  - London
  - Block_7
    - Cabinet_22
    - Rack
    - Rack

- Service
  - ADSL
  - PVC
  - VPN
  - IP_Address
  - E-Mail
  - Web Site
  - Video
  - Gaming

Object Classes

- Routers
  - 3Com
  - Cisco
    - 2XXX
    - 6XXX
      - 2303
      - 6400

Credit Check

Modelling

Allocation
Fulfilment Solution

Putting the pieces together
CGEY ETTx OSS Architecture

CNS IE2100 Integration

TIBCO CNS Event Bus

CNS Event Gateway

Tibco RV daemon
Mapping
Event Agent
protocol

IE2100

TCP Connection

CNS Event Agent

XML Payload
On TIBCO message bus

XML Parser
CLI Parser
Commit Engine

Cisco IOS 12.2 (1) T

Web Server
Java Servlets/ASP pages

HTTP Connection

CLI Templates
XML Translator

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ETTx – IP VPN OSS Architecture

VPNSC Integration

AxiOSS
Service Fulfilment

CIC
Service Assurance

InfraNet
Service Billing

CIC
Service Billing

TIBCO CNS Event Bus

Plug-and-play Deployment

IE2100

VPNSC
L3, L2 VPN Activation
CGEY ETTx Demo

Show that it works
Service demonstrated in the activation process

- Internet Access with Low/High QOS
- Voice over IP
- Multicast Video
- Billing interface with portal

Network Equipment involved

- 6509 II switch + MSFC II
- 3500 switch
Configuration done by Axiom

6509
- VLAN creation/removal
- Security VACL relying on VLANs (with MLS)
- Security on trunk ports to 3524
- QOS VACL applied on outgoing traffic from VLANs

MSFC
- DHCP server configuration
- Router configuration
- Multicast configuration
Configuration done by Axiom

**3524**
- VLAN Creation/removal
- Port vlan allocation/removal

**827-4V (also used as Voice Gateway)**
- Send a configuration order to CNS
- VOIP : client’s signaling & IP configuration/removal
- Telephone number configuration/removal
Billing - Portal

- Customer account (create – suspend – remove)
- Per service update (enable – disable)
- Billing is done, within the demo, based on flat fees
- Enhancement of the demo is scheduled to include usage based fees
  - Radius Accounting tickets (Service Selection with SSG/SESM, VoIP need rating engine)
  - IP usage based on NetFlow collector and Portal IP mediation interface
  - Low entry solution based on per user port traffic with in-house development and IPDR ticket format (Collect through SNMP Mib2 or proprietary large counter)
Activation of a new client by Axiom

1. Create VLAN, set global security, set the QoS and trunk security
2. Create VLAN, allocate VLAN to user port, activate port
3. Create the DHCP server, the routing instance for the vlan

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1. Set the QoS to 32k/s for the internet service.
2. Allow internet traffic to be forwarded to the client.
Internet service Change QOS to High

1. Change the QOS from 32kb/s to 1Mo/s
1. Set the QOS to 512k/s for the voice service
2. Allow VOIP traffic to be forwarded to that client
3. Send an order to CNS to activate the telephone number and IP address on the voice gateway
4. CNS activates the telephone number and IP address on the 827-4V for the new client
1 Set the QOS to 1512k/s for the Multicast video service
2 Allow multicast traffic to be forwarded to that client
1. Forbid VOIP signaling traffic to transit to the client through VACL configuration. Clear the QOS for that service.

2. Send an order to CNS to deactivate the user telephone number and IP on the voice gateway.

3. CNS deactivates the telephone number and IP address on the 827-4V for the new client.
Deactivation of the client by Axiom

1. Remove VLAN, global security & QOS for the VLAN and trunk security
2. Remove VLAN, deallocate VLAN from user port, deactivate port
3. Remove the DHCP server, the routing instance for the VLAN

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Axiom DSL Demo

Show that it works
AXiOSS configures a Service contract with customer details and sends contract to customer.

Customer places order

AXiOSS

Order to Service

contracts

Customer site 1

Customer site 2

Customer site 3

service provider network

Cisco

Powered Network

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Real-time inventory checking to expose possible delays. IMS orders item from stock & replenishes it if need be.

AXiOSS
AXiOSS

Order to Service

Allocate to Field Personnel

Allocate to Exchange Personnel

Allocate to Stores Personnel

Exchange equipment configured and final transmission test

Stores Personnel ship DSL kit to Field and/or Exchange
AxiOSS

Cisco Provisioning Center

CPC returns success/failure to AxiOSS
Response from Exchange Personnel

Response from Exchange Personnel

Works completion notice received from Field and Exchange personnel.

Other OSS systems return RFS message to AXiOSS.
Information is captured and provided into Post Sale CRM activity for use in retention and extension strategies.