Mobile Wireless Network Management & Billing

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Mobile Wireless Network Management & Billing Agenda

- NW Architecture Review
- Cisco's Internet OSS
- Cisco's Mobile Wireless Solution
  - Architecture
  - EML Products
  - SML Products
- Billing Solution

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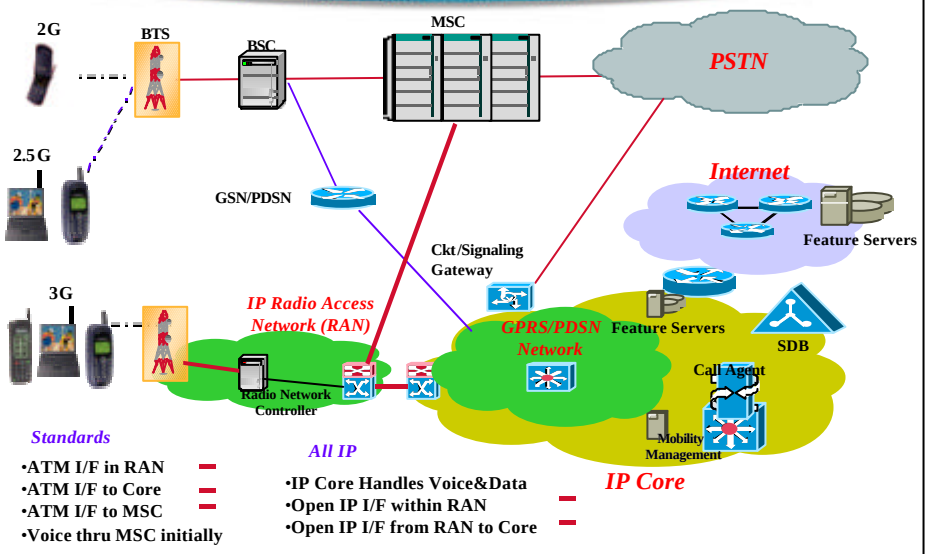
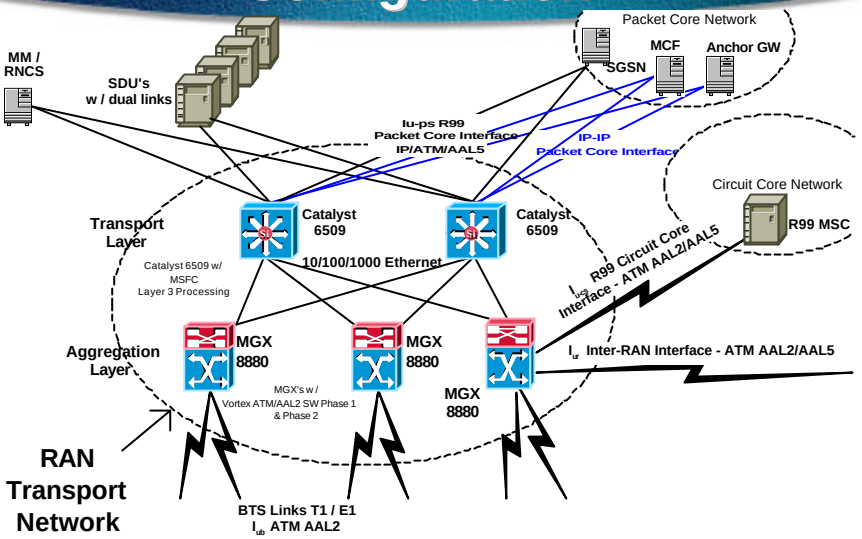
Cisco 3G Strategy



Proposed 3G Equipment Configuration



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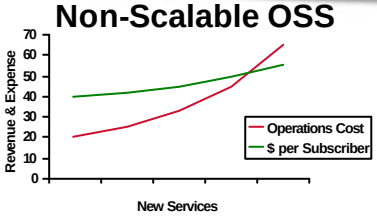
How do you get from here to there?

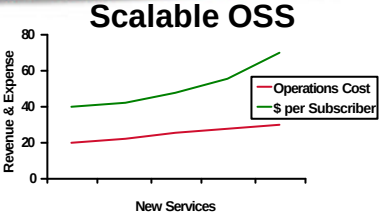
OSS/BSS Systems →

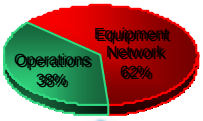
Impact of a Scalable OSS End-to-End Network and Operations Management

Non-Scalable OSS



Scalable OSS



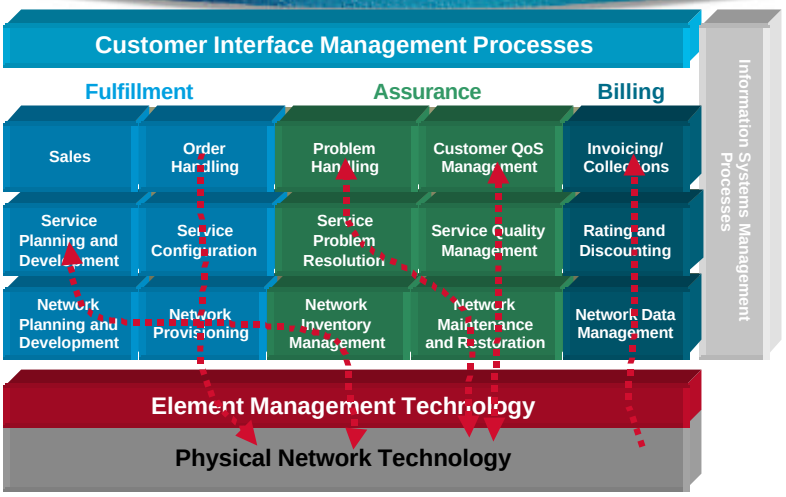


Operation Expenses Occupies ~40% of the TCO of a Service Provider

Source: The Yankee Group

- **Benefits of Internet OSS:**
  - Service provisioning velocity
  - SLA conformance
  - Accounting and billing accuracy
  - Operations responsiveness
  - Speed of integrating new products
  - Dramatically lower TCO

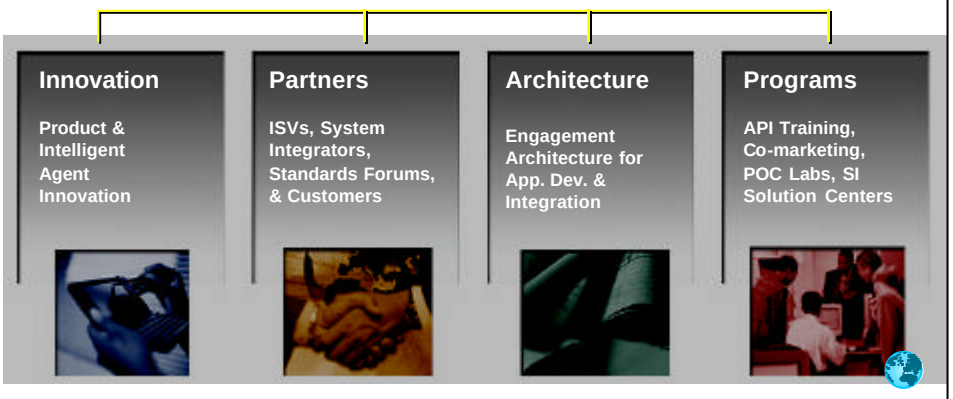
Ideal OSS / BSS Information Communication



Source: Telecom Operations Map, TM Forum

Cisco's Internet OSS Strategy

Innovation + Ecosystem Approach



Address Service Provider Attributes Essential for OSS Services

Scalability

- SP class networks —today and future
- Number of devices/objects/data managed
- Easy to add capacity
- Extendible

Availability

- Persistent/reliable event/data support
- Redundancy support
- Auto-failure support —warm and/or hot-standby
- Recovery support

Serviceability

- Fault Isolation and diagnostics support
- Online fix and upgrades
- Software distribution support —local and remote

Manageability

- Condensed NOC interfaces (advanced GUIs)
- Integrated data stores/inventory

Internet OSS: FCAPS

Functional View based on TMN reference

	Fault Management	Configuration Management	Accounting Management	Performance Management	Security Management
BML	Alarm policy, Repair processes Test policy, Trouble reporting policy.	Order Management, Provisioning policy, Procurement policy.	Usage process , Pricing policy. Billing Policy.	Service Level Mgt, Exception threshold policy.	Revenue change control, access policy, fraud management.
SML	Service test, Trouble reporting, Trouble ticket query & notification.	Installation, deployment, customer/subscriber service definition.	Feature pricing, Usage charge, correlation, validation & aggregation.	Customer performance reporting, traffic reporting.	Customer profiling, usage patter analysis, customer security administration, service intrusion detection/recovery.
NML	Network fault event correlation & filtering, Network fault isolation, Circuit testing, trouble ticket administration.	Network connection management, network installation management.	Network usage correlation, usage data storage.	Traffic management. network capacity analysis, network performance characterization, network data aggregation & trending.	Traffic pattern analysis, network security alarm. Network security breach detection & recovery.
EML	NE alarm management. NE fault localization and correction. Element log control	NE loading, installation, administration & status generation.	NE usage data collection, usage data validation.	NE trend analysis. NE capacity planning, performance collection and analysis.	NE security alarm management, NE audit trial management.
NEL	Failure event detection, reporting.	Configuration enforemenct. Parameter validation, reporting and enforcement.	Element Probe. Usage data generation and storage.	Element probe. Detection and reporting of state change.	Element access control, intrusion detection, reporting and auto-recovery.

IOSS: FCAPS

A Multi-dimensional View

Compound/Integrated Functions

Directory-Enable Networking Services *Cross-domain policy serive*

Bandwidth Broker

SLA Management *Managed Services/Scope Management*

Personalized Subscriber Services

FCAPS (Framework, Networks Services & Applications)

	Fault Management	Configuration Management	Accounting Management	Performance Management	Security Management
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Domain Systems

Broadband

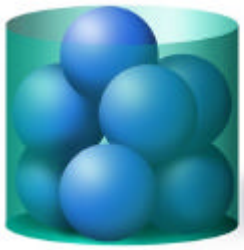
Content Delivery/Portal

Voice

Voice

Continue momentum towards a distributed architecture

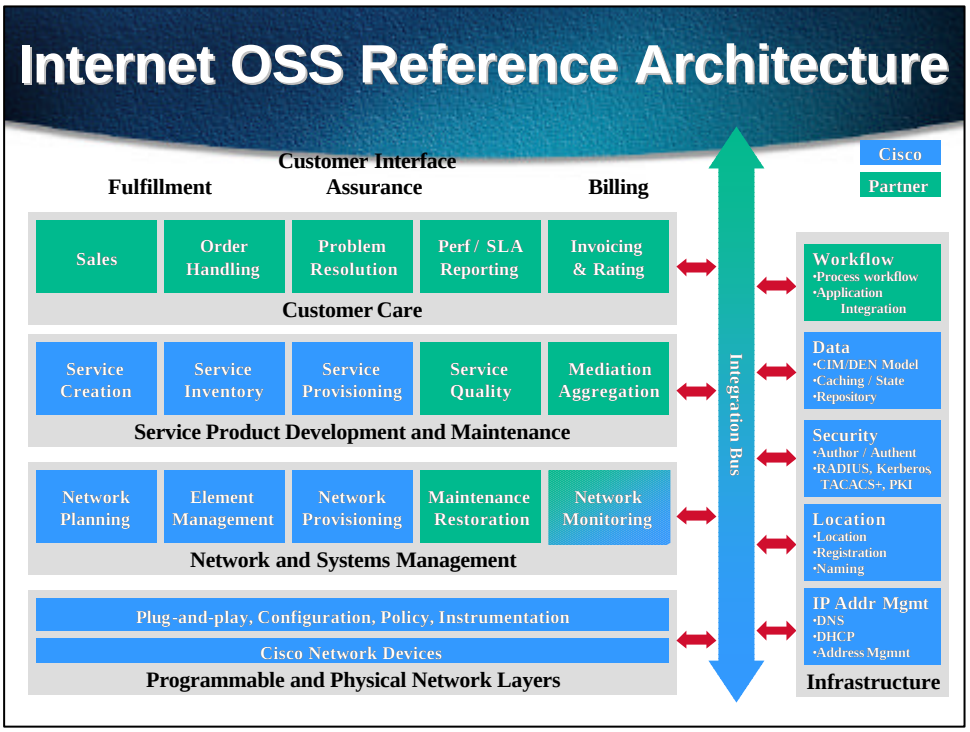
One-Stop Shop

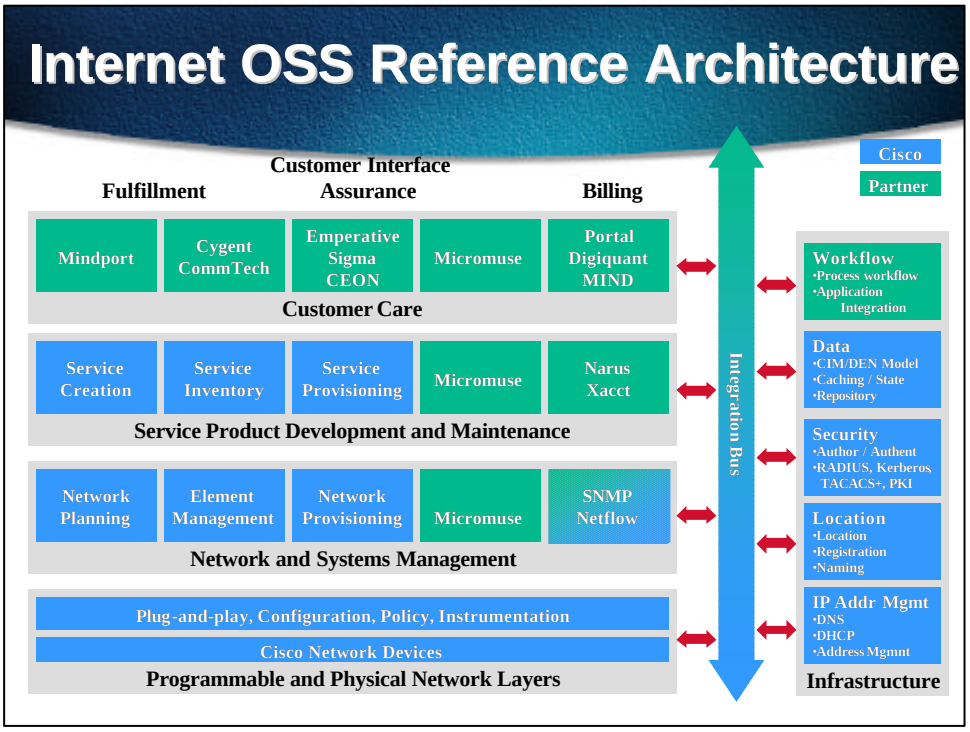


- Vertical integration
- Closed architecture
- Proprietary platforms
- Forced fit solutions
- Investment lock-in
- Long lead times

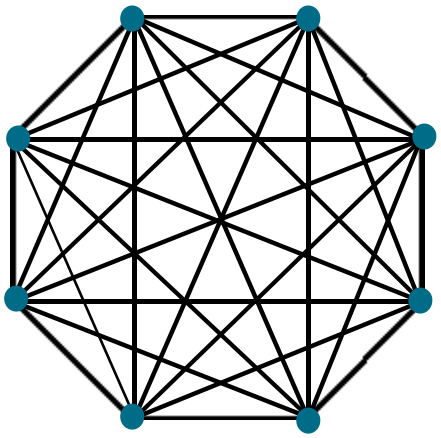
Ecosystem Model

- Horizontal partnerships
- Open architecture
- Industry standards
- Best-of-breed solutions
- Investment protection
- Fast market access


Internet OSS Reference Architecture
Customer Interface
Fulfillment
Assurance
Billing
Cisco
Partner
Sales
Order Handling
Problem Resolution
Perf / SLA Reporting
Invoicing & Rating
Customer Care
Service Creation
Service Inventory
Service Provisioning
Service Quality
Mediation Aggregation
Service Product Development and Maintenance
Network Planning
Element Management
Network Provisioning
Maintenance Restoration
Network Monitoring
Network and Systems Management
Plug-and-play, Configuration, Policy, Instrumentation
Cisco Network Devices
Programmable and Physical Network Layers
Integration Bus
Workflow
•Process workflow
•Application Integration
Data
•CIM/DEN Model
•Caching / State
•Repository
Security
•Author / Authent
•RADIUS, Kerberos, TACACS+, PKI
Location
•Location
•Registration
•Naming
IP Addr Mgmt
•DNS
•DHCP
•Address Mgmnt
Infrastructure


Internet OSS Reference Architecture
Customer Interface
Fulfillment
Assurance
Billing
Cisco
Partner
Mindport
Cygent CommTech
Emperative Sigma CEON
Micromuse
Portal Digiquant MIND
Customer Care
Service Creation
Service Inventory
Service Provisioning
Micromuse
Narus Xacct
Service Product Development and Maintenance
Network Planning
Element Management
Network Provisioning
Micromuse
SNMP Netflow
Network and Systems Management
Plug-and-play, Configuration, Policy, Instrumentation
Cisco Network Devices
Programmable and Physical Network Layers
Integration Bus
Workflow
•Process workflow
•Application Integration
Data
•CIM/DEN Model
•Caching / State
•Repository
Security
•Author / Authent
•RADIUS, Kerberos, TACACS+, PKI
Location
•Location
•Registration
•Naming
IP Addr Mgmt
•DNS
•DHCP
•Address Mgmnt
Infrastructure

Old Way



- N^2 Complexity
- New Services hard
- Data Consistency
- Heavy messages

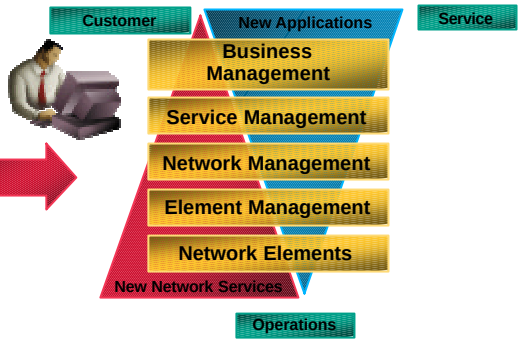
Old Way - Silo Approach

- Vertical Management Solutions
  - –vendor specific point integration
  - –fixed service architectures
  - –minimal multi-vendor interaction
  - –limited equipment inter-operability
  - –slow incremental service delivery
  - –service specific management systems

Making the Transition

Today' s Back Office "Silos"

New OSS Infrastructure



Move from traditional "Silo-based systems" to a flexible process-driven OSS with multiple layers of abstraction

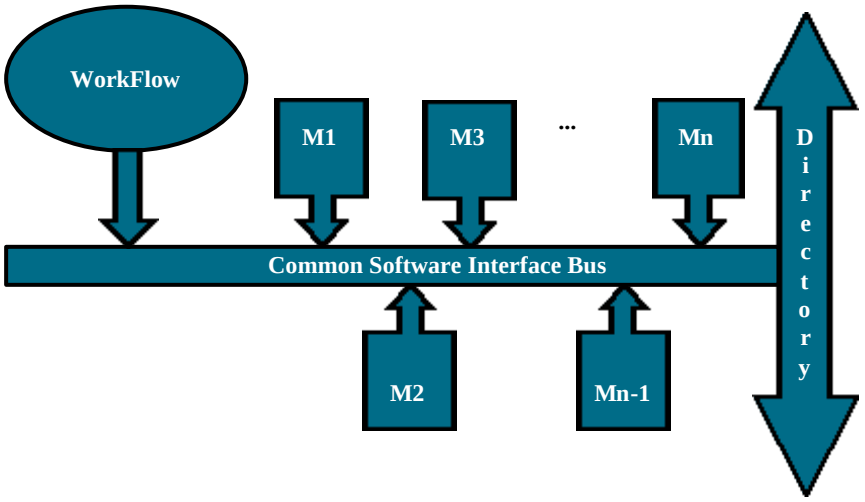
New Way - Plug & Play Approach

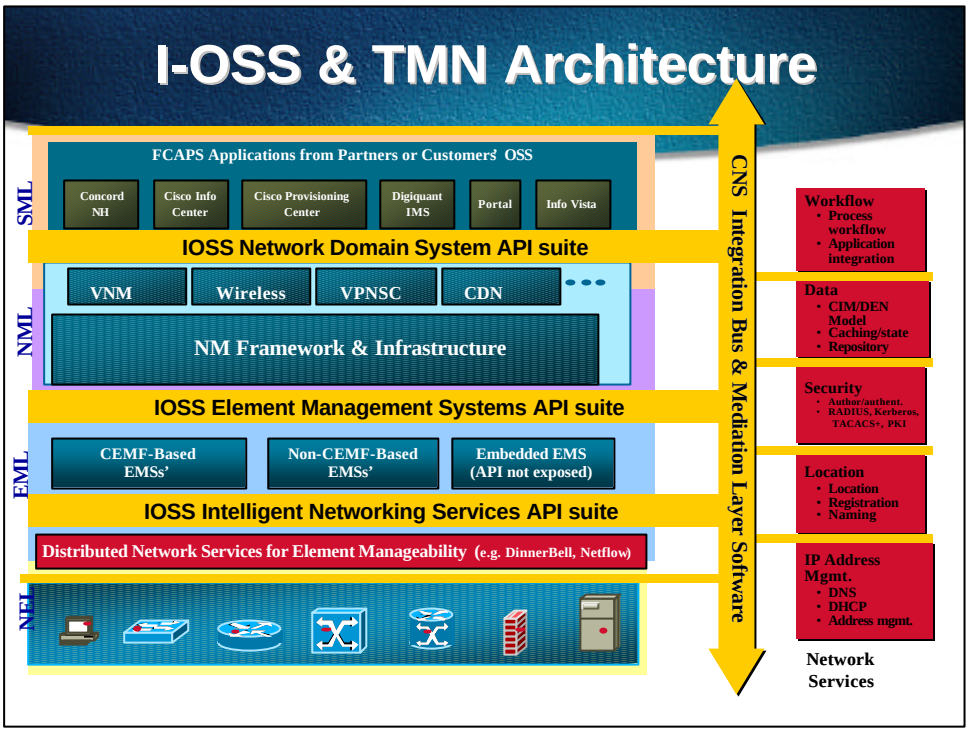
- **Horizontal Management Solutions**
  - –Ecosystem based open integration
  - –flexible service architectures
  - –standards-based multi-vendor interaction
  - –increased equipment inter-operability
  - –rapid incremental service delivery
  - –service independent management systems

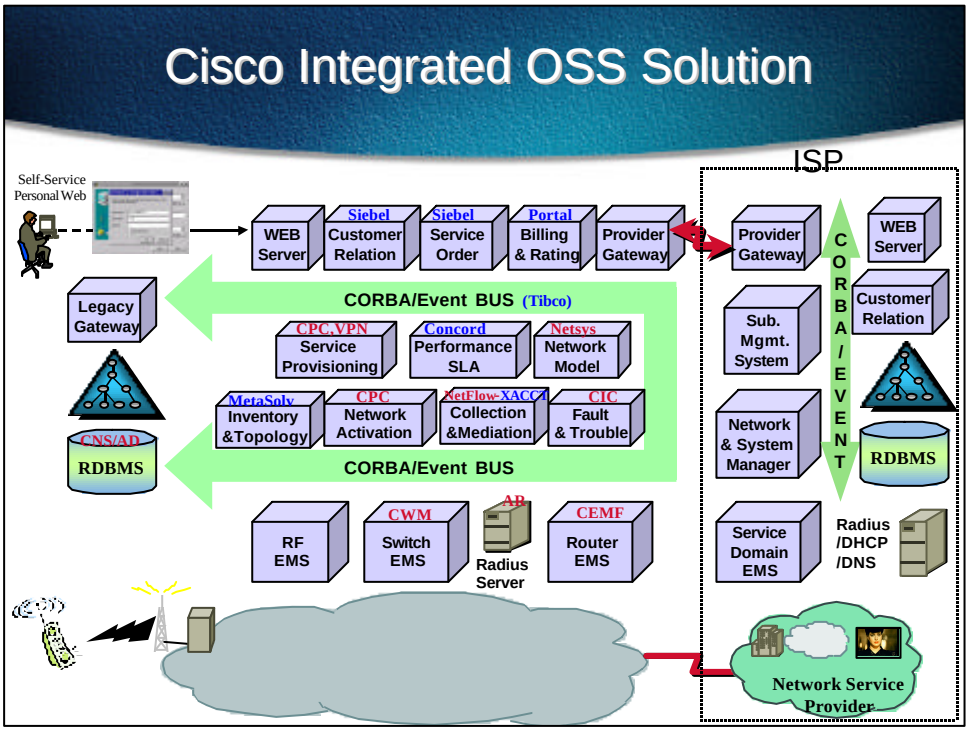
Middleware

- **Bus Architecture**
  - Plug in Components
  - Lower Integration Barrier
- **Data Mapping / Directory**
  - Map to formats / Common Info
- **Work Flow**
  - Centralized, configurable control component
  - Rapid service creation

New Way




I-OSS & TMN Architecture
SML
NML
EML
NEL
FCAPS Applications from Partners or Customers' OSS
Concord NH
Cisco Info Center
Cisco Provisioning Center
Digiquant IMS
Portal
Info Vista
IOSS Network Domain System API suite
VNM
Wireless
VPNSC
CDN
NM Framework & Infrastructure
IOSS Element Management Systems API suite
CEMF-Based EMSs'
Non-CEMF-Based EMSs'
Embedded EMS (API not exposed)
IOSS Intelligent Networking Services API suite
Distributed Network Services for Element Manageability (e.g. DinnerBell, Netflow)
CNS Integration Bus & Mediation Layer Software
Workflow
• Process workflow
• Application integration
Data
• CIM/DEN Model
• Caching/state
• Repository
Security
• Author/authent.
• RADIUS, Kerberos, TACACS+, PKI
Location
• Location
• Registration
• Naming
IP Address Mgmt.
• DNS
• DHCP
• Address mgmt.
Network Services


Cisco Integrated OSS Solution
ISP
Self-Service Personal Web
WEB Server
Siebel Customer Relation
Siebel Service Order
Portal Billing & Rating
Provider Gateway
Provider Gateway
WEB Server
Customer Relation
Legacy Gateway
CORBA/Event BUS (Tibco)
CPC,VPN Service Provisioning
Concord Performance SLA
Netsys Network Model
MetaSolv Inventory &Topology
CPC Network Activation
NetFlow-XACCA Collection &Mediation
CIC Fault & Trouble
CNS/AD RDBMS
CORBA/Event BUS
Sub. Mgmt. System
Network & System Manager
RDBMS
CORBA/EVENT
RF EMS
CWM Switch EMS
AP Radius Server
CEMF Router EMS
Service Domain EMS
Radius /DHCP /DNS
Network Service Provider

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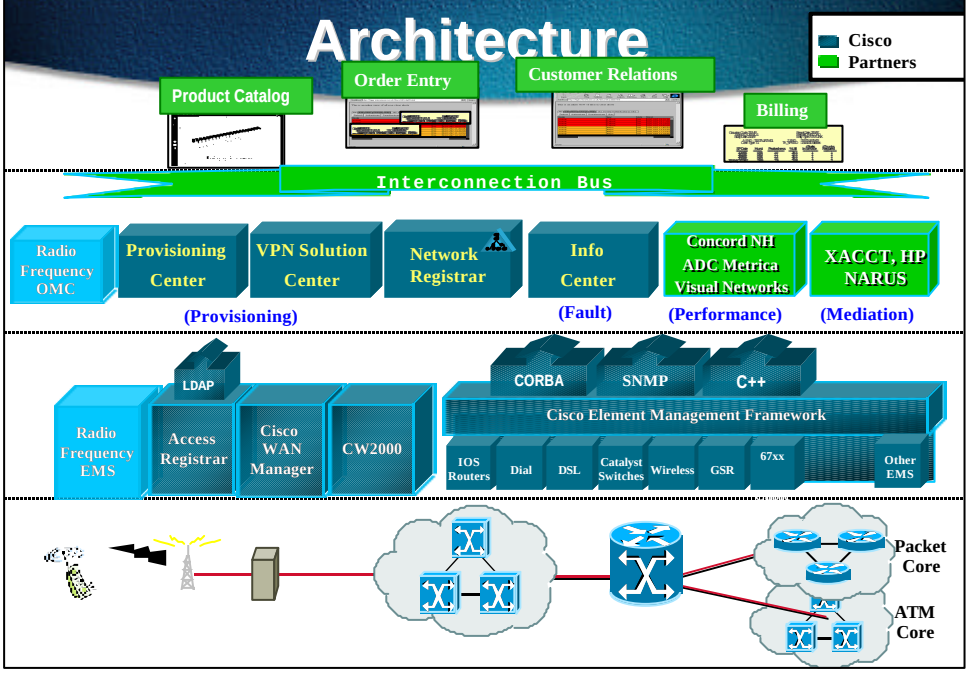
Mobile Wireless Management Strategy

- Objective is to build Mobile-OSS Management infrastructure to support all Cisco devices used in Mobile networks.
- Cisco will use existing Cisco EML products for all router (all non Cellular) tasks
  - CW2000 based management system for initial phase, low end of the market, upcoming trials and initial deployment.
  - CEMF+API+FEM based management system for High end market.
- TMBU will build Network Element solutions for Mobile Wireless functional elements
  - Add additional Mgmt capability (SNMP) in IOS for supporting robust EMS.
  - Proxy Agents/APIs on EMS for integration with OMC and other OSS
- Third Party vendors for FCAPS Management
  - CIC/MicroMuse, RiversoftFM; Syndesis-CM ; Portal/Belle-AM ; Concord Communications/ADC Metrica-PM

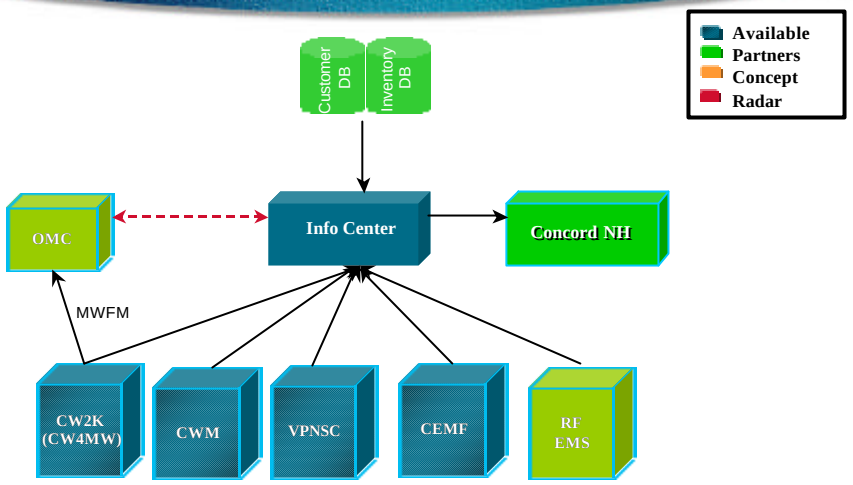
Mobile Wireless Management Strategy Continued

- Drive standards based domain-style management strategy into all partners.
  - Cisco manages cisco equipment, by domain
  - Ran Vendor manages Ran Vendor equipment
  - Other vendors (channels) are responsible for their own solution
- Intra-domain and inter-domain interfaces/APIs are standards based
  - Northbound APIs are CORBA-IDL (TIBCO, Vitria)
- Leverage ecosystem relationships to drive end-to-end solution
- Build ecosystem for wireless-applications

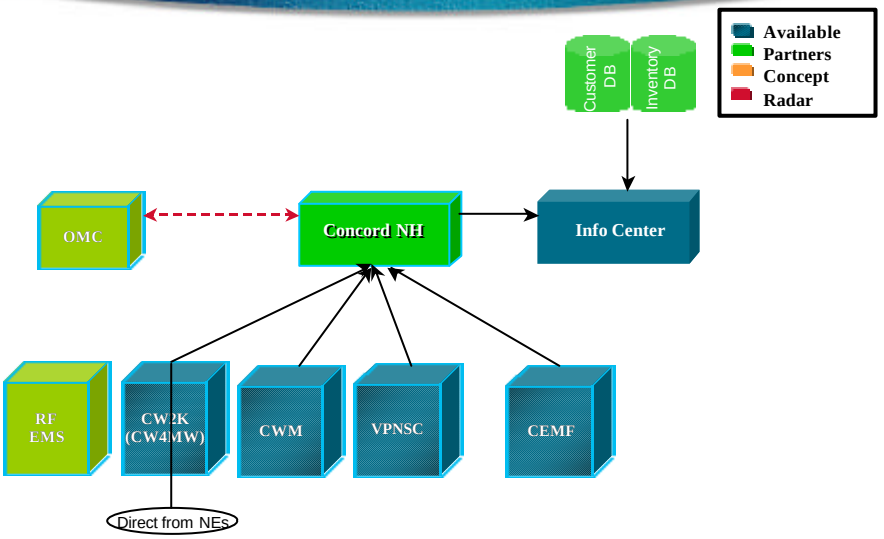
Mobile Wireless OSS Architecture



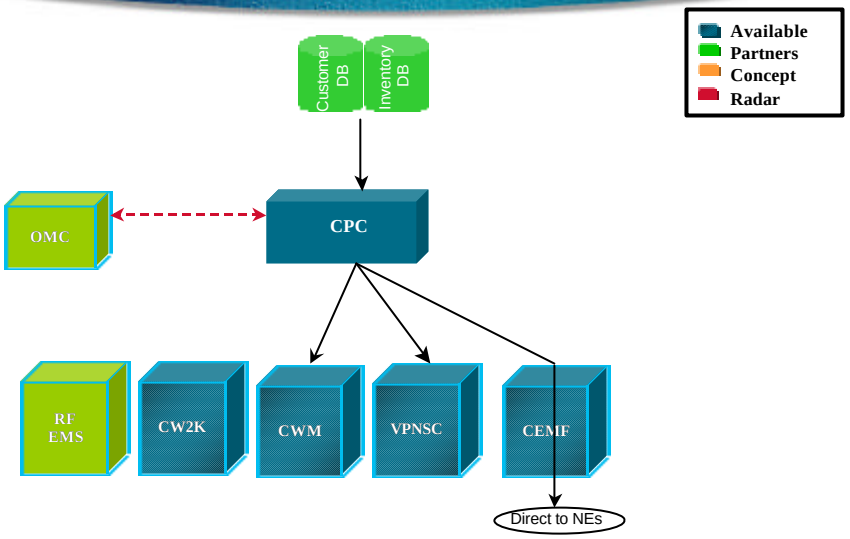
Mobile Wireless Fault Management



Mobile Wireless Performance Management



Mobile Wireless Provisioning



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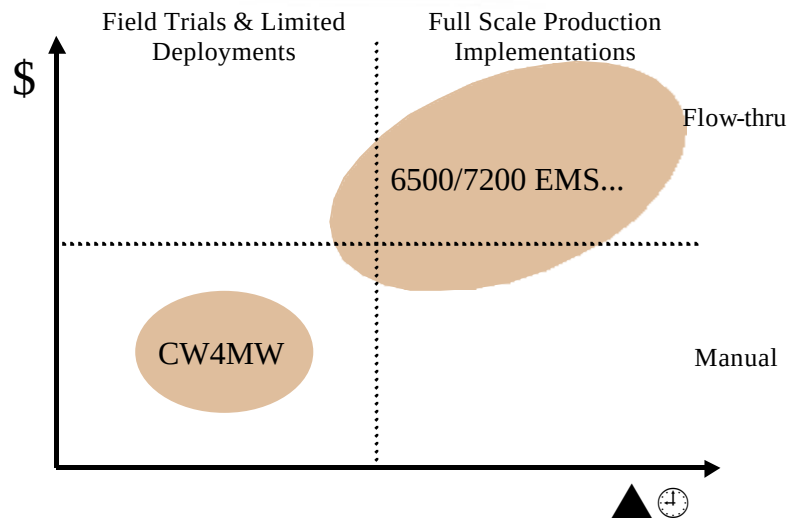
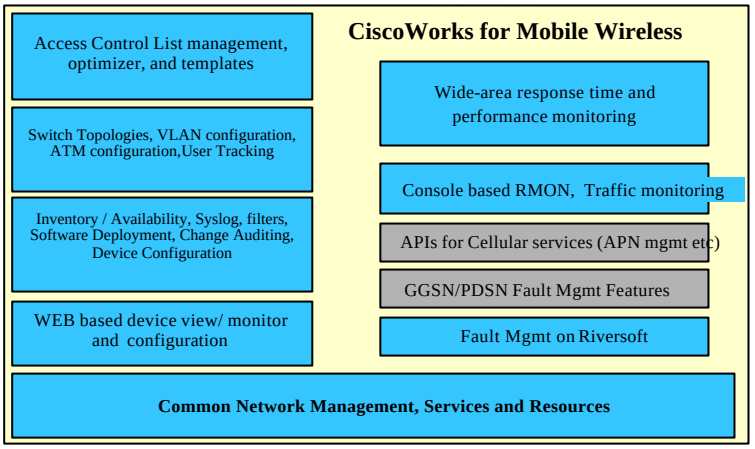
Cisco EML Goals

- Wireless features embedded in current products: must manage rest of the device(s) as existing IP NEs
- Scale to high end of marketplace: Provide ability to handle field trials and limited deployments
- Total reuse of EML for GSM, CDMA and UMTS
- Common EML and APIs for integration in multi-vendor environments
- Domain level modularity, plug-in to OSS architecture: enables OSS ecosystem.
- Accommodate flow-through for policy and security servers
- Support cisco and 3G IP-based service models

Cisco EML Strategy



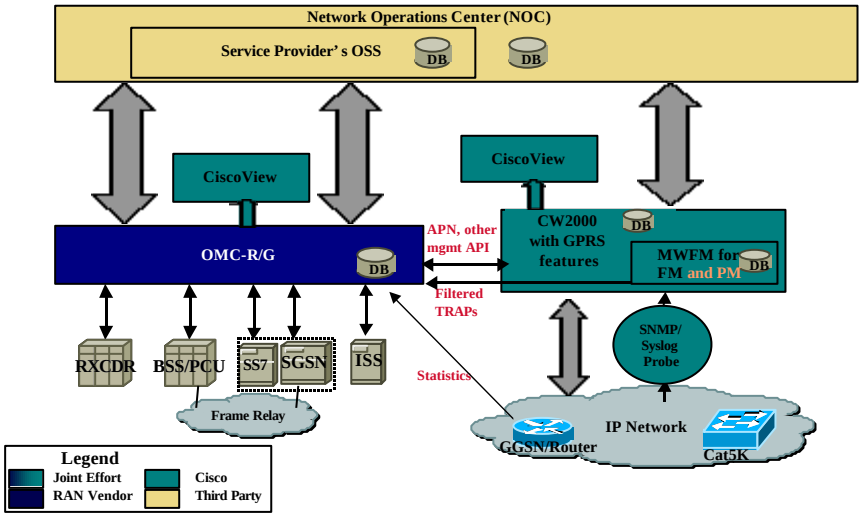
CiscoWorks for Mobile Wireless



= CW2000 Standard Applications
= Cellular Value added features

CiscoView packages for GPRS (R1.2, 1.3, 1/4, 2.0)
APIs for OMC-G integration (APN management)
Fault Management w/SMARTS

Mobile Wireless EML&NML Architecture



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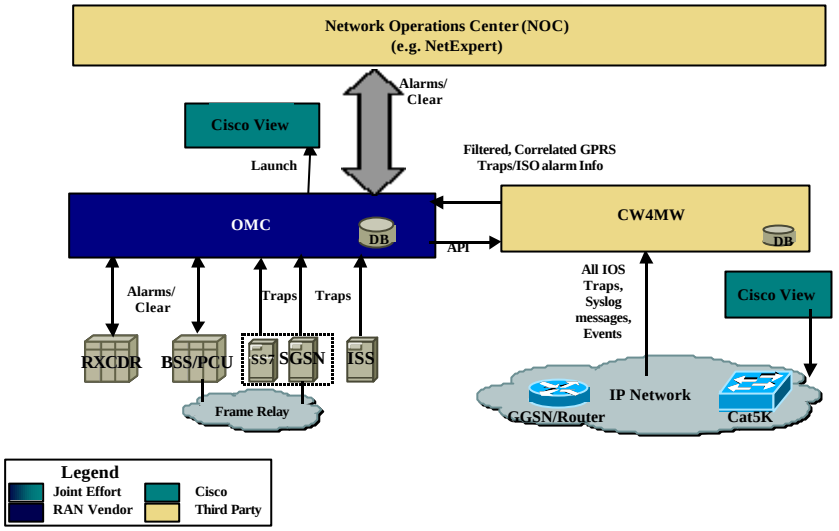
Mobile Wireless FM w/ CW4MW



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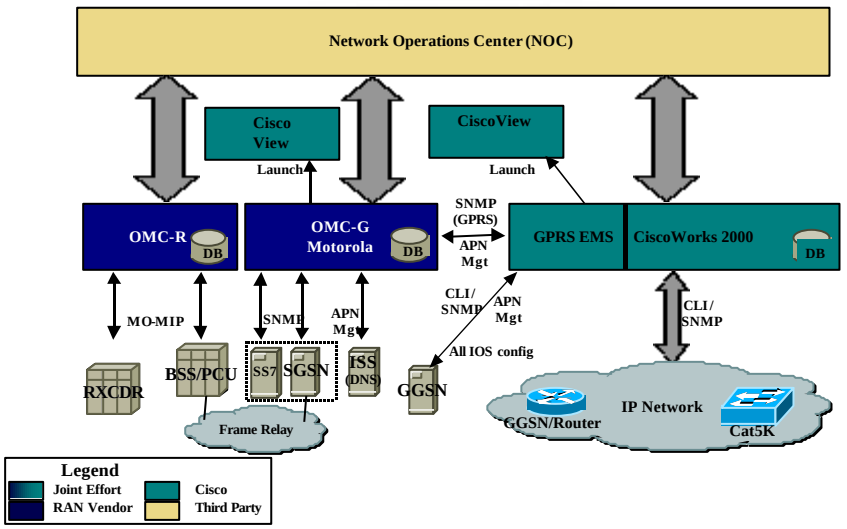
Mobile Wireless S/W Load & CM



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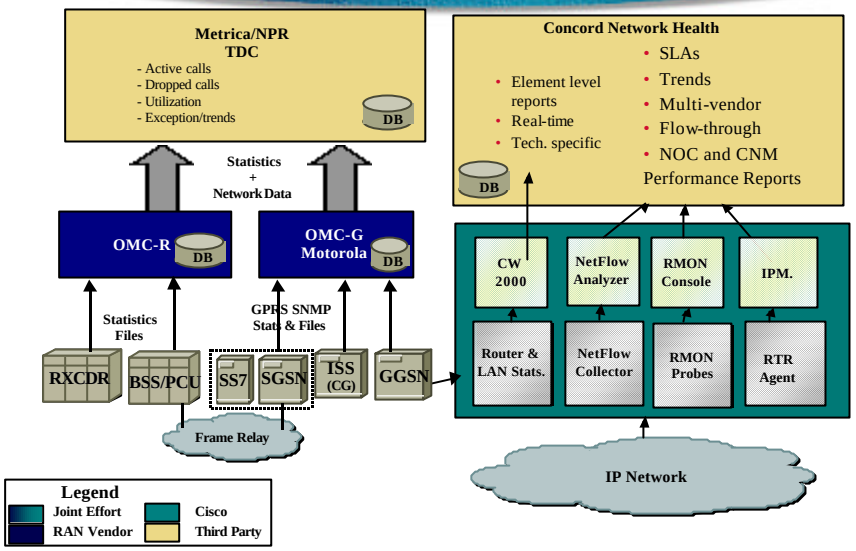
Mobile Wireless PM



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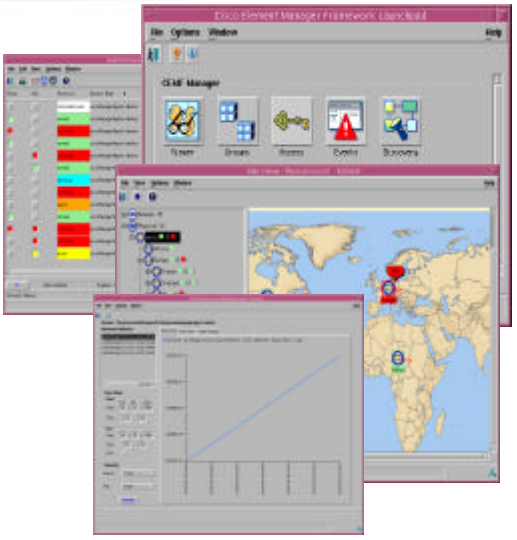
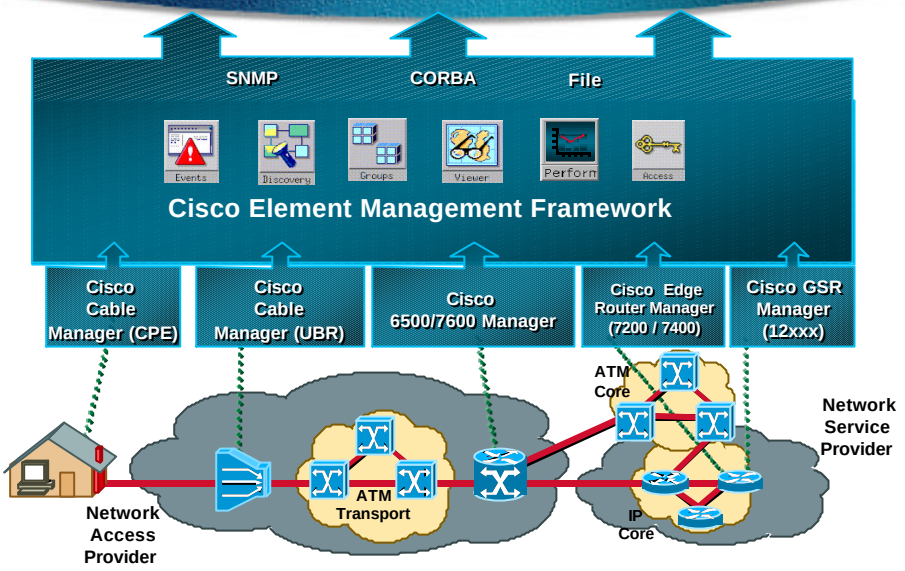
Cisco Element Management Framework (CEMF) Overview

- CEMF provides end to end element management, regardless of technology or protocol.
- CEMF is an Element Management Framework that provides FCAPS management for carrier class networks
- Device-specific EMS Blades "plug into" CEMF and provide device specific mediation between device and CEMF applications



CEMF Element Management



Cisco Element Management Framework
Value Proposition

Enables Service Providers to:

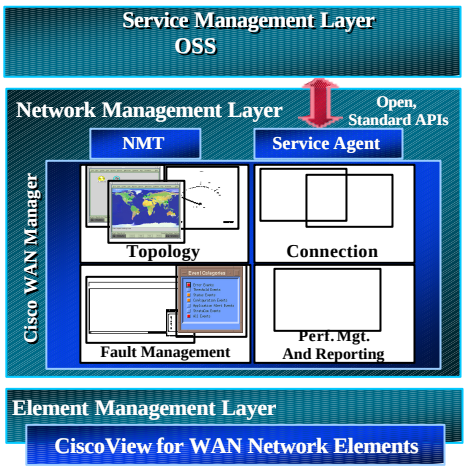
- Roll out service more quickly to maximize revenue
- Future proof service offering(s) when deploying new technologies
- Significantly reduce cost of deployment & operations
- Leverage single, consistent, standards based framework for end-to-end management and integration

CEMF Benefits for Customers

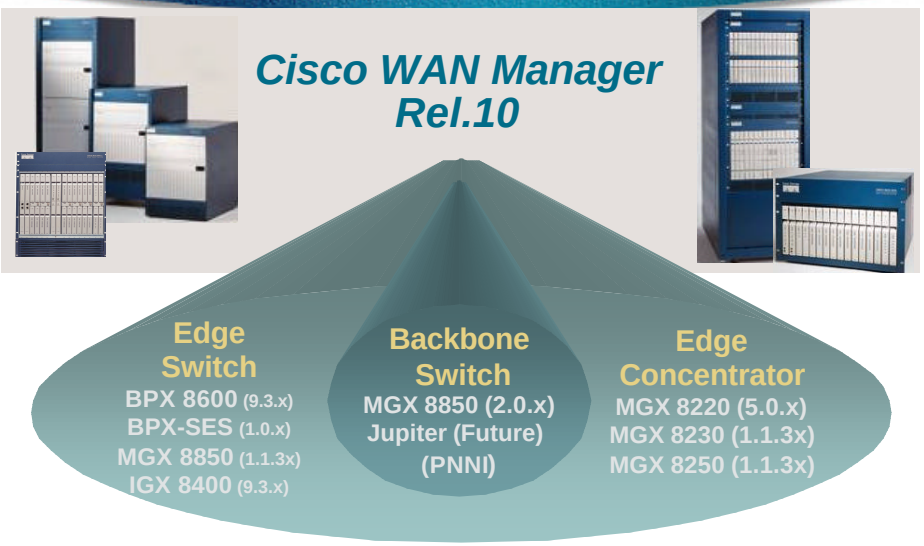
- Consistent element managers across access, edge, and core
  - Easier, cheaper OSS integration
  - Reduced upgrade costs
  - Reduced Operator training
- Scalability in supporting carrier-class networks and leading-edge technology

Cisco WAN Manager Scalable, Real-Time, Flow-through Operations Management

- WAN L2 management
  - ATM, Frame Relay, voice, and legacy data services
- Highly scalable
  - Reduced management costs of network expansion and service deployment
- Standards-based APIs
  - Facilitates OSS integration
  - Reduced systems integration costs
- Flow-through automation
  - Reduced operations costs through automation
  - Rapid, error-free service deployment
- Robust, reliable architecture
  - Data, network, and service integrity
  - Fault-tolerant, mission-critical ready
- Multiplatform support
  - Flexible deployment options



Supported Multiservice Platforms



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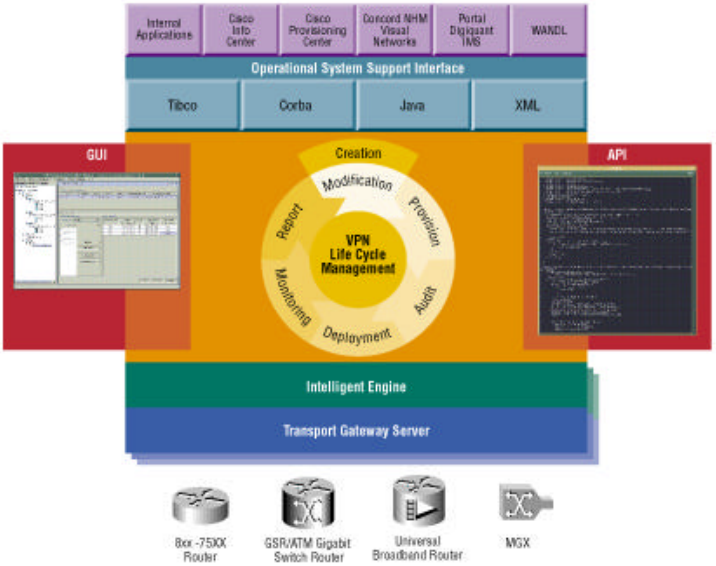
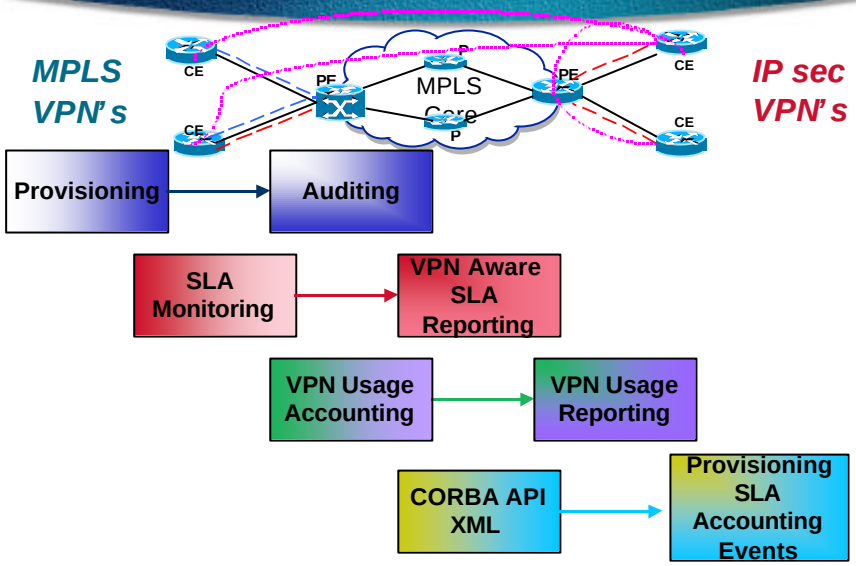
VPN Services Lifecycle Management



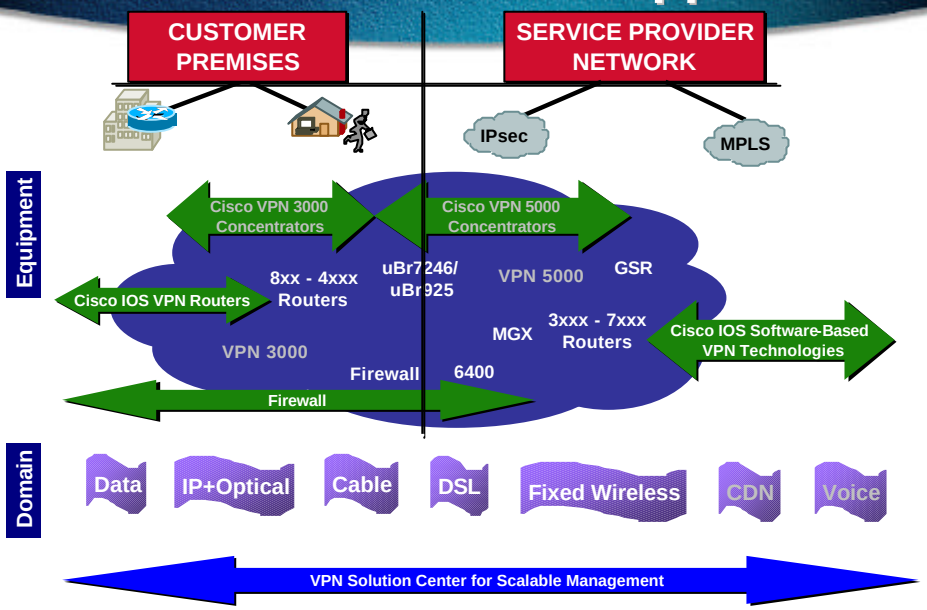
VPNSC

- Is Cisco's defacto Service Management platform for multiple IP VPN technology offerings
  - Managed MPLS VPN
  - Managed IPsec VPN
- Provides across the board support for all MPLS and IPsec VPN enabled Platforms

Cisco VPN Solutions Center Features



Domains and NE Support

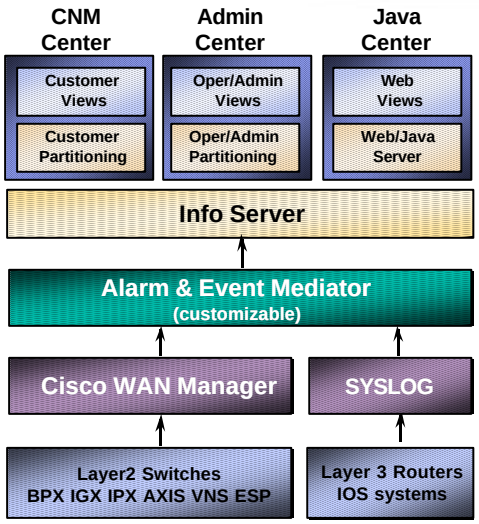


Virtual Private Network Solution Center
Value Proposition

Enables Service Providers to:

- **Accelerate time-to-market of new value add MPLS & IPSEC VPN services.**
- **Automate the provisioning, billing, and monitoring of MPLS & IPSEC VPN services.**

Cisco Info Center (CIC)
Overview



- **Event consolidation,correlation, de-duplication & filtering**
- **Collect & consolidate events from multiple sources on the network**
- **VPN, CNM, and resource partitioning support**
- **Scalable and robust product components**
- **Powerful administrative desktop GUI**
- **Distributable mgmt. of service & network affecting faults**

Cisco Information Center
Value Proposition

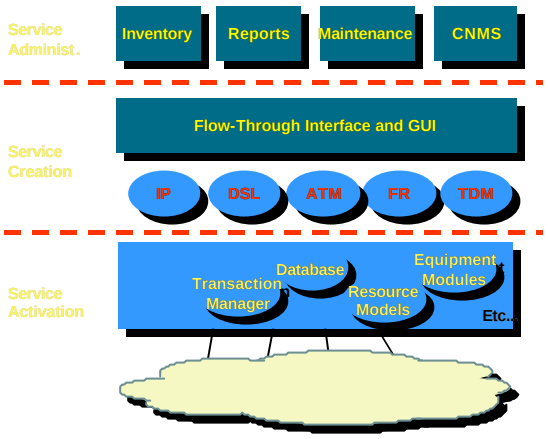
Enables Service Providers to:

- **Maintain and increase the uptime of network-based customer services and applications.**
- **Reduce the MTTR *(Mean Time to Resolution)* of network faults and remain compliant with customer SLAs.**

Cisco Information Center
Benefits

- **Rapid ROI (out of the box support)**
- **Scalable (distributed architecture)**
- **Flexible (easily customized)**
- **Supports mission critical services and applications (SLA)**

Cisco Provisioning Center
(CPC) Overview



- Comprehensive service creation and service activation via a single step.
- Perform a change request *(across multiple network elements)* in a single transaction.
- Single provisioning interface to create/activate services across multiple technologies & multiple products

Cisco Provisioning Center
Value Proposition

Enables Service Providers to:

- **Create and activate services across multiple technologies and multiple products.**
- **Automate service provisioning and guarantee network integrity.**
- **View instantaneous associations between subscribers and network resources.**

Cisco Provisioning Center
Benefits

- **One-step activation** (fast service creation)
- **Unique end-to-end service profiles**
- **Service and subscriber view of resources**
- **Bulk provisioning**

Mobile OSS Solution SWAT

Strengths
- Compelling Intelligent networking vision
- CPN (unique position to enhance SP value to Cisco Enterprise Customers
- Multi-vendor integration strategy
- Consistent partnership messaging and engagement philosophy

Weaknesses
- Perception is that Cisco lacks SP quality and scale
- OSS-shy sales field
- Lack of motivation to sell OSS solutions given heavy partnering component
- Lack of common architecture
- Lack of packaging and pricing

Opportunities
- Compete w/OSS Solution while maintaining High Profit Margins
- Better market alignment strength through leverage of multiple Ecosystem partners
- Break the Vendor OSS lockout
  Increase competitiveness of Cisco solution through innovation and market competition

Threats
- Vendors with Vertically Integrated OSS Strategies will be in a position to lock competition out of customer
- Nortel is able to convince carriers that they are in the best position to deliver on next generation OSS capabilities because of both IP and Carrier OSS expertise

Mobile Wireless Network Management & Billing Agenda

- NW Architecture Review
- Cisco' s Internet OSS
- Cisco' s Mobile Wireless Solution
  - Architecture
  - EML Products
  - SML Products
- Billing Solution

Past Service Progression

time

- Call duration and long distance (wireline)
- Call duration, LD, and air time (regain license fees)
- Call duration, LD, air time and supplementary services
- Call duration, LD, air time, SS and vmail
- Monthly fees: bundled air minutes, SS, LD
- Monthly fees: bundled airtime, SS, free LD
- Monthly fees: free LD, bundled airtime, and SMS messaging/unit and excess bundle charges
- Monthly fees, free LD, bundled airtime, SMS/unit and web pages/bundle and excess bundle charges

Voice has become a commodity, need new revenue streams

Existing Cellular Services

Personal Services

Family Plan

- group calling, vmail, 60 mins @ $25/month, + roaming + LD, group calling
- group calling, vmail, 400 mins @ $50/month, + roaming + LD, group calling
- group calling, vmail, 600 mins @ $70/month, + roaming + LD, group calling

National Rate Bundle Plan

- wireless phone @ $30/month + wireline LD @ $07/min + $.10/min wireless LD

National Prepaid Plan

- 30, 60, 120 or 240 bundles of prepaid minutes

Business Services

Business Wireless Service

- LD, Group Calling, Vmail, messaging, wireless data, Flat Rate

Flat Rate Plan

- 600 mins @ $90/month + LD
- 1000 mins @ $120/month + LD
- 14000 mins @ $150/month + LD

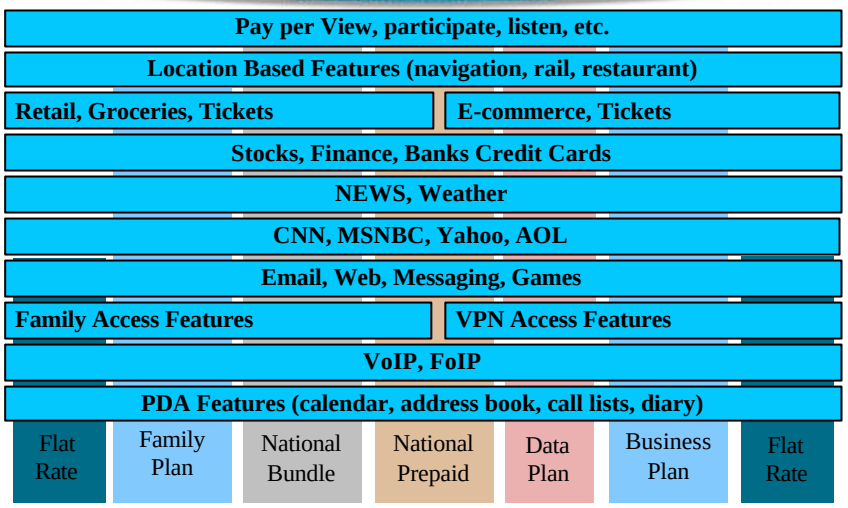
Wireless Data Plan

- VPN access @ $20/month
- calendar, email, address book,call list personal organizer, limited FAX, VPN access, content access (i.e. CNN) $30/month
- IP service @ $.05/kbyte
- local flat rate @ $60/month + $.05/kbyte when roaming

New Service Models

- IP-usage is not time or distance oriented
- No Long Distance on the Internet
- Air Interface is unreliable transport mechanism
- Avoid counting packets
- Feature Server based service primitives (location, telemetry, etc.) Offer value added services.
- Time of day usage provided via AAA servers
- Tiered class of service (CoS) model best suited. Begin with two tier, basic CoS and premium CoS

Sample 3G Cellular Services



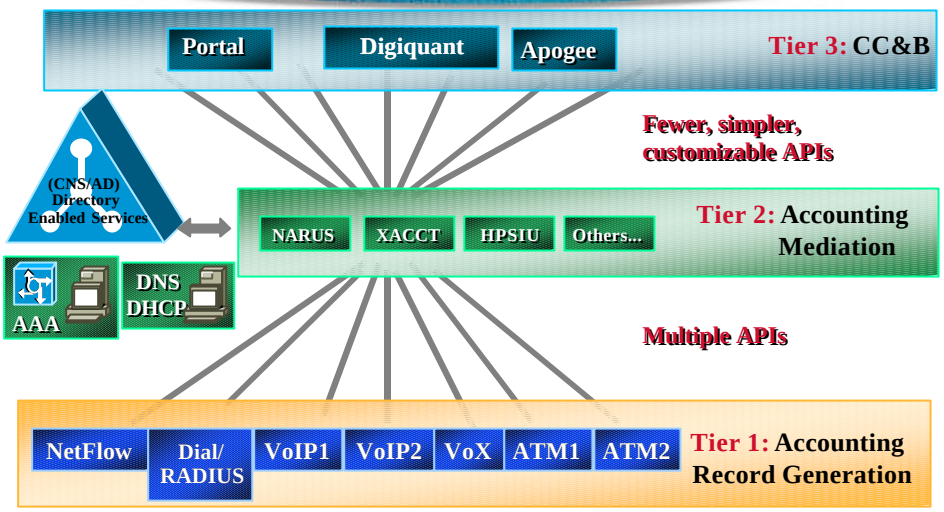
Future Service Progression

time

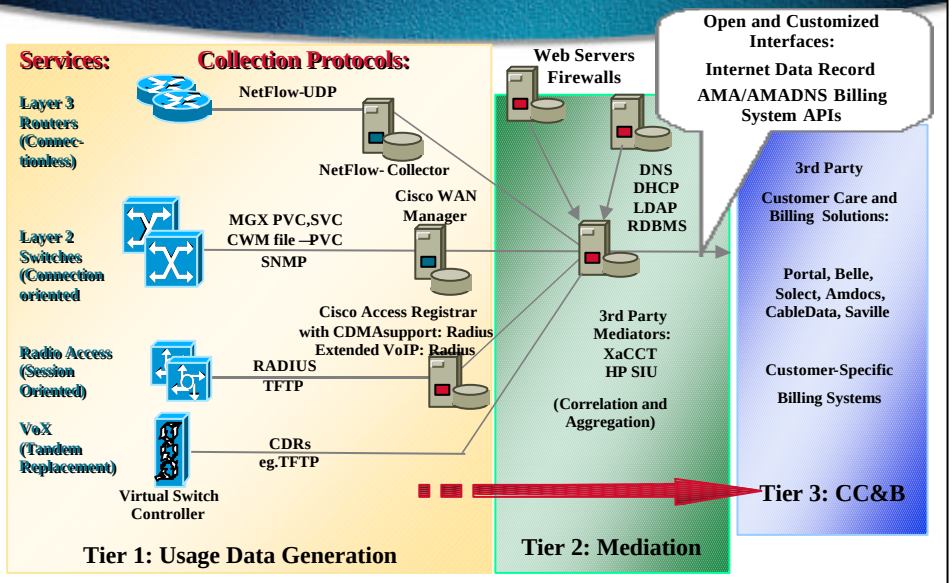
- **Charged by transaction:**
  Secure transactions cost more, real time bill presentment and self-care
- **Charged by content access**
  Content personalization a starting differentiator, rapidly becomes a commodity
- **Bundled services:**
  Voice - includes LD, bundle of airtime minutes. Excess charges for supplementary services, additional airtime
  Value Added Services - content hosting (calendar and other PIM, free email) and per message (SMS and pages)
- **Compound model:**
  Bundled SS, bundled airtime &messaging, coupled with transaction based billing for VAS

Subscriber retention through superior experiences and VAS

Cisco's Mediated Approach to Billing



The Cisco Billing and Mediation Architecture



CISCO SYSTEMS

Wireless

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