



Cisco SP Strategy

**Paolo Campoli, Director of Solutions BD
European & Emerging Markets**





New Telecom Competitive Environment

- **Internet Players:**

Google
Microsoft (MSN)
Yahoo!
Ebay (Skype)

- **Outsourcers**

IBM, HP, EDS
Telecom services as part of large outsourcing contracts
E.g. Lloyds

Non facility-based Players

New Telecom Industry Environment

Regulated Players

- **MNVO:**

Agility, profitability
Pressure on mobile operators
E.g. Vanco

- **Wireline + Cable Operators:**

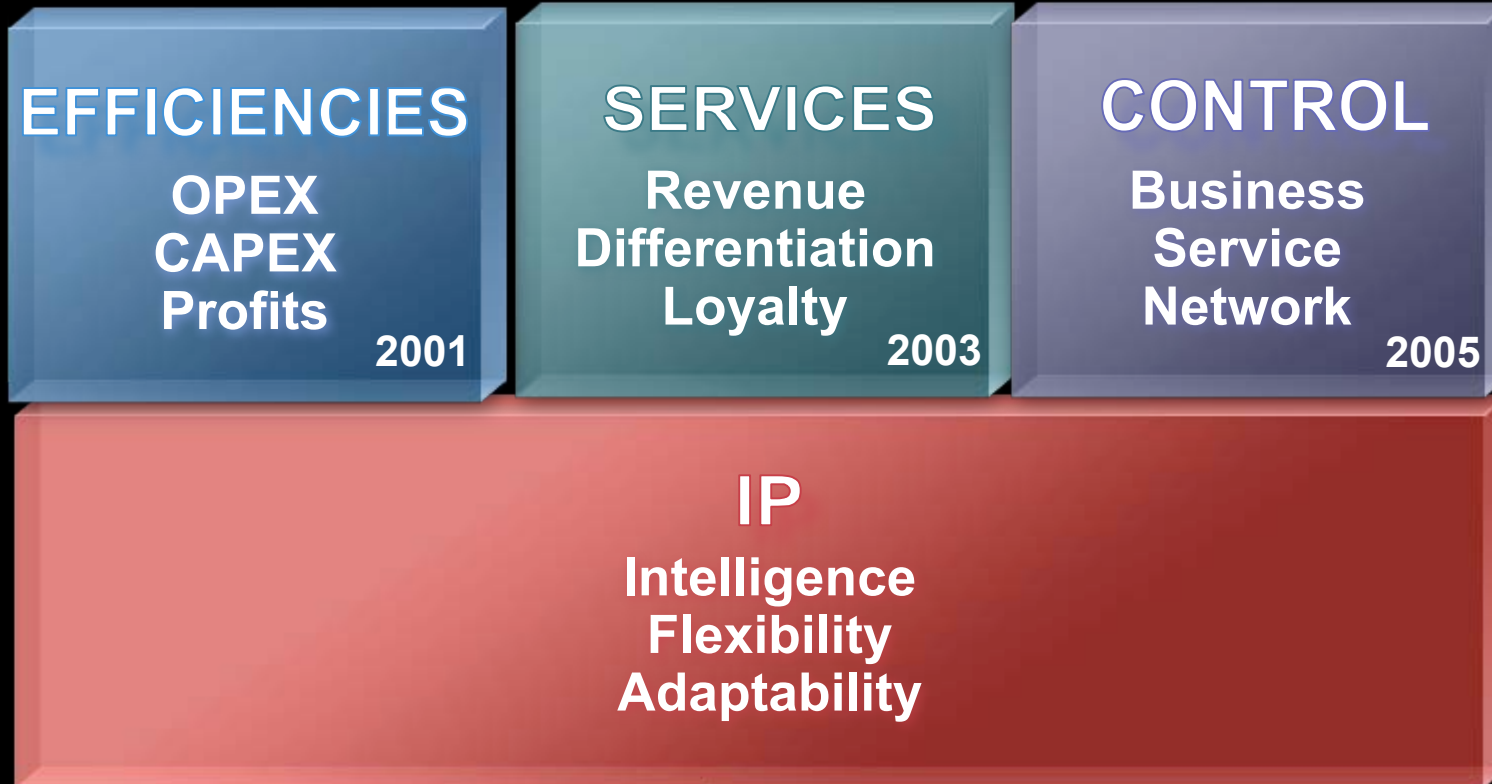
Increased competition
Development of low cost SPs
Regulation (e.g. ULL)
IP, Fixed-mobile substitution

- **Mobile Operators:**

Voice saturation, data services
FMC convergence
Mobility (3G, WiFi)
Broadband access (Vodafone)



IP NGN from Voice optimizations to a full drive towards ...

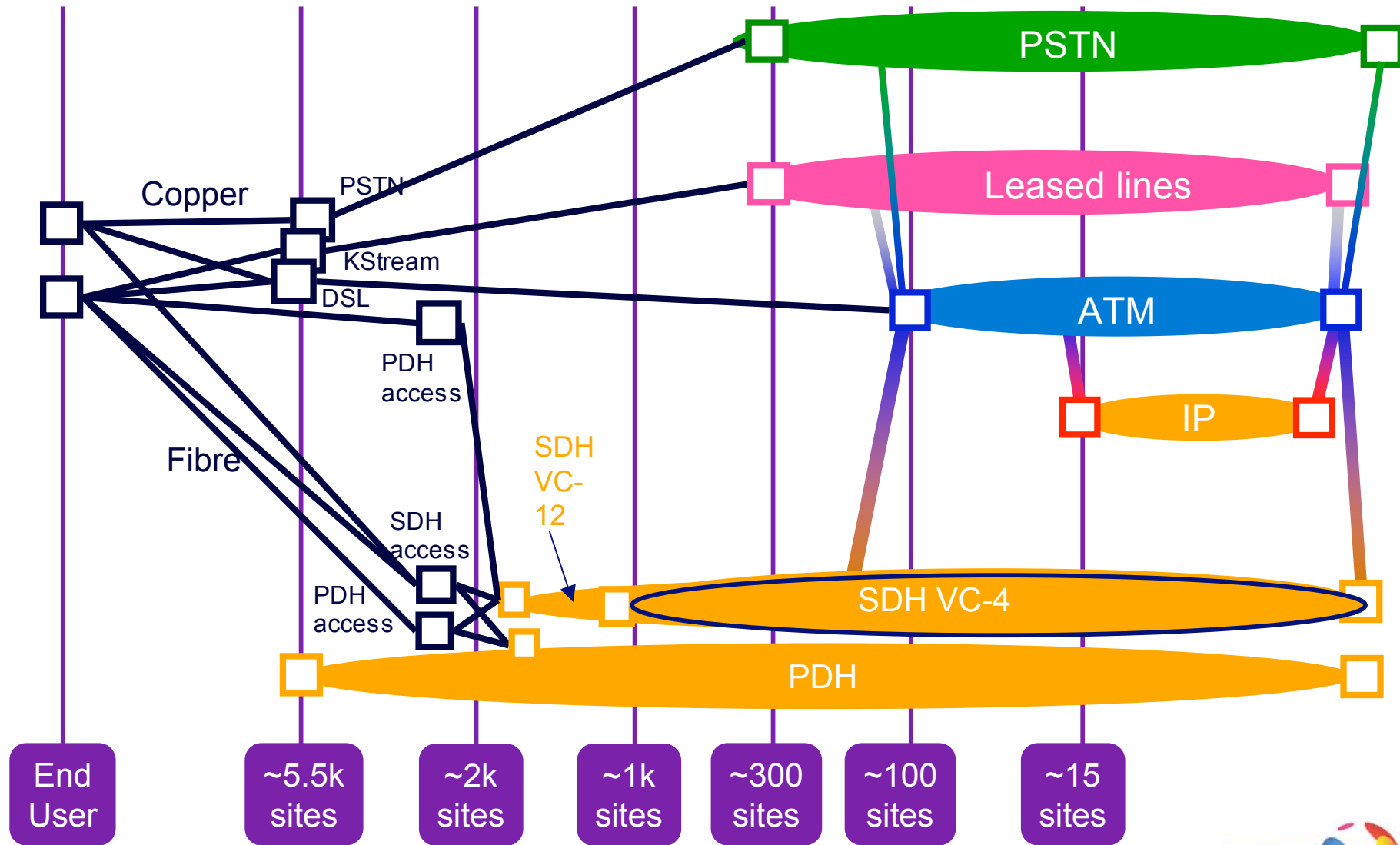




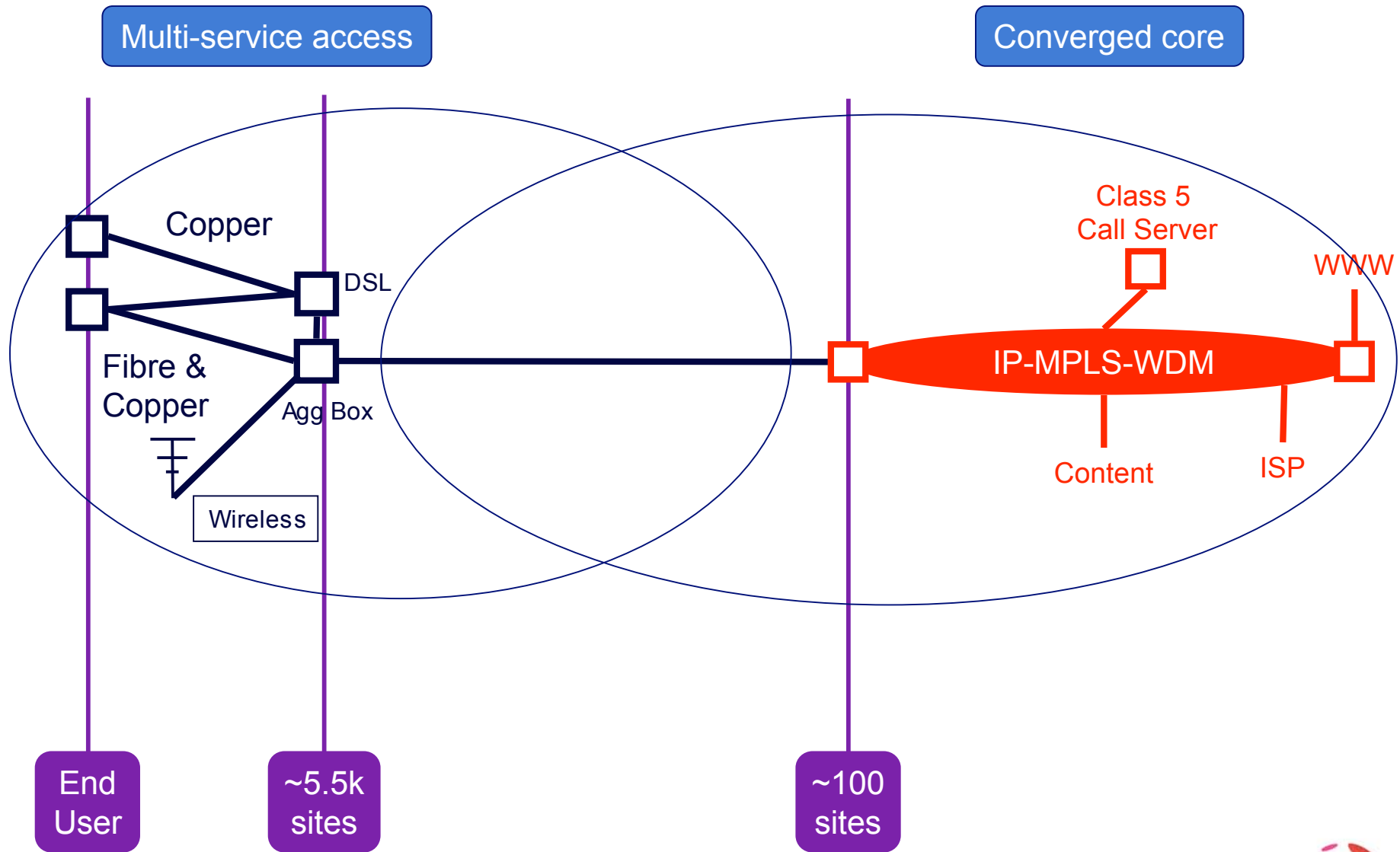
Few words on “efficiencies”



How OPEX reduction is being achieved, BT network – current



BT 21CN - simplified network

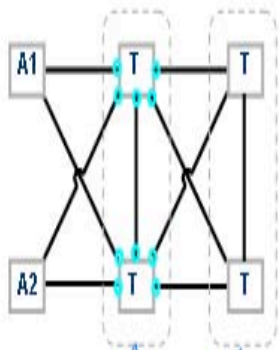


Current thinking. No implementation assurances



NGN Opex reduction Real life example

Before

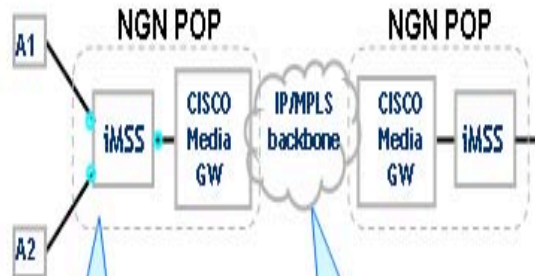


Groups of transit nodes to be "collapsed" into a single one

After

NGN Enhanced Solution

- A Access TDM switch
- T Transit TDM switch
- Switching port

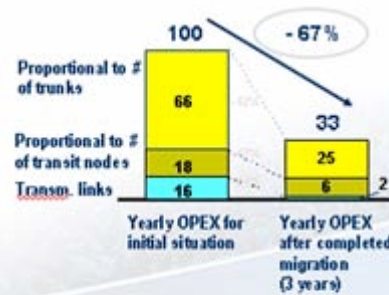


Less switching ports needed because a greater number of access nodes go to the same transit node

Concentrated links (from meshed to star)
Bandwidth Compression

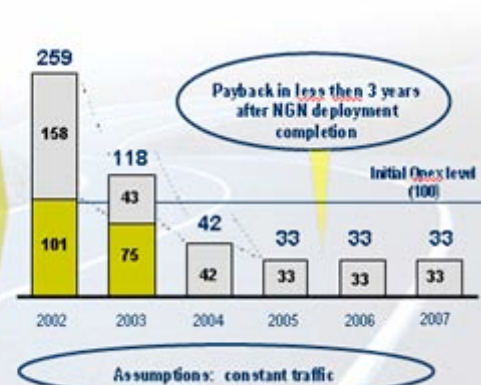
Economic benefits

Transit network OPEX
Normalized units (100 = initial OPEX level)



Note: CAPEX savings related to freed TDM nodes and trunks that can be reused in the access network not considered in the results

Yearly economic impact
Normalized units



Telecom Italia Wireline Mission Statement

"To become the best-in-class wireline operator through customer care excellence, product innovation, leadership in technology, top efficiency/effectiveness, fast and entrepreneurial organization"

Business Drivers for Voice over IP Migration

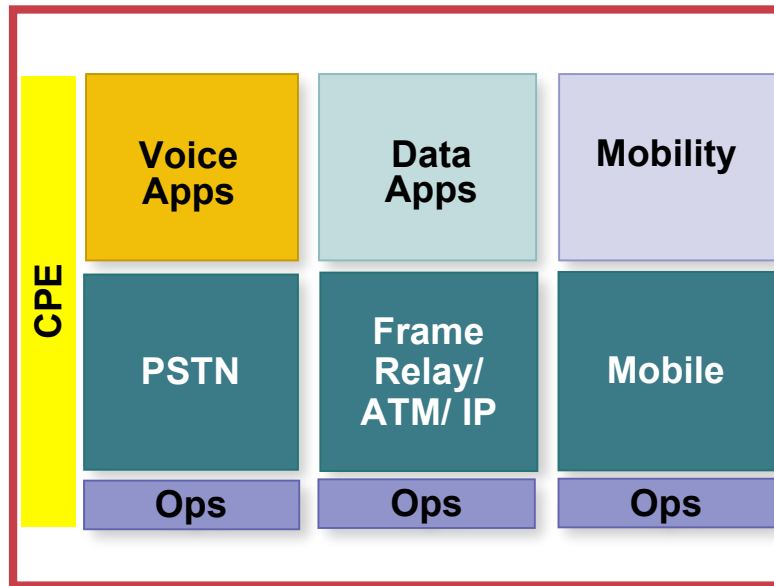
- Stalled growth in switched access revenue
- Cost and complexity of managing multiple legacy networks
- Need to reduce operational expenses
- Pressure to launch new services to keep ahead of competition
- New subscriber growth must be principal trigger for network investment

Business Benefits of Voice over IP Migration

- Achieved a 30 percent reduction of 2003 operating expenses
- Projecting a 40 percent reduction of 2004 operating expenses, dropping to 60 percent in 2005
- Projecting 50 percent reduction in long-term capex, compared to Class 4 switch costs

Operational Savings Are Dependent upon a Significant Change in Operating Model

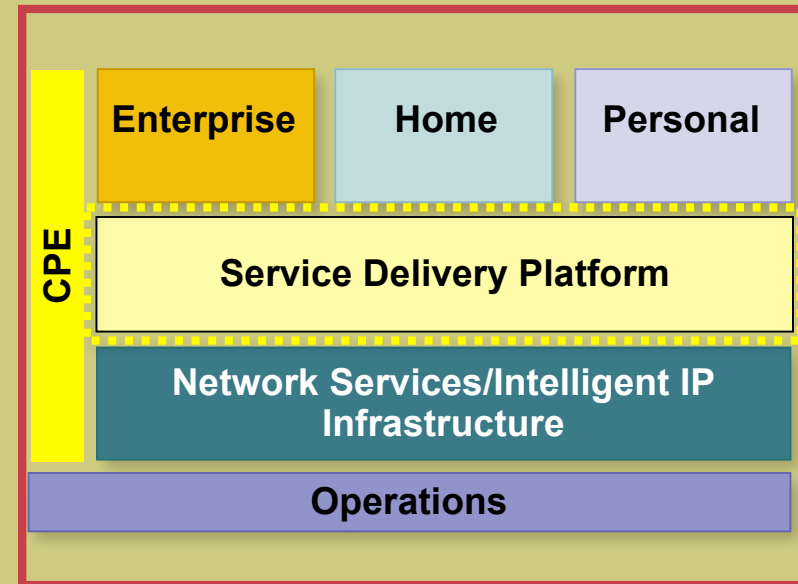
Current Operations



Characteristics:

- New networks for new services
- Overlay systems and processes
- Costly to integrate
- Constrained innovation
- Vulnerable to focused competitors

Future Operations

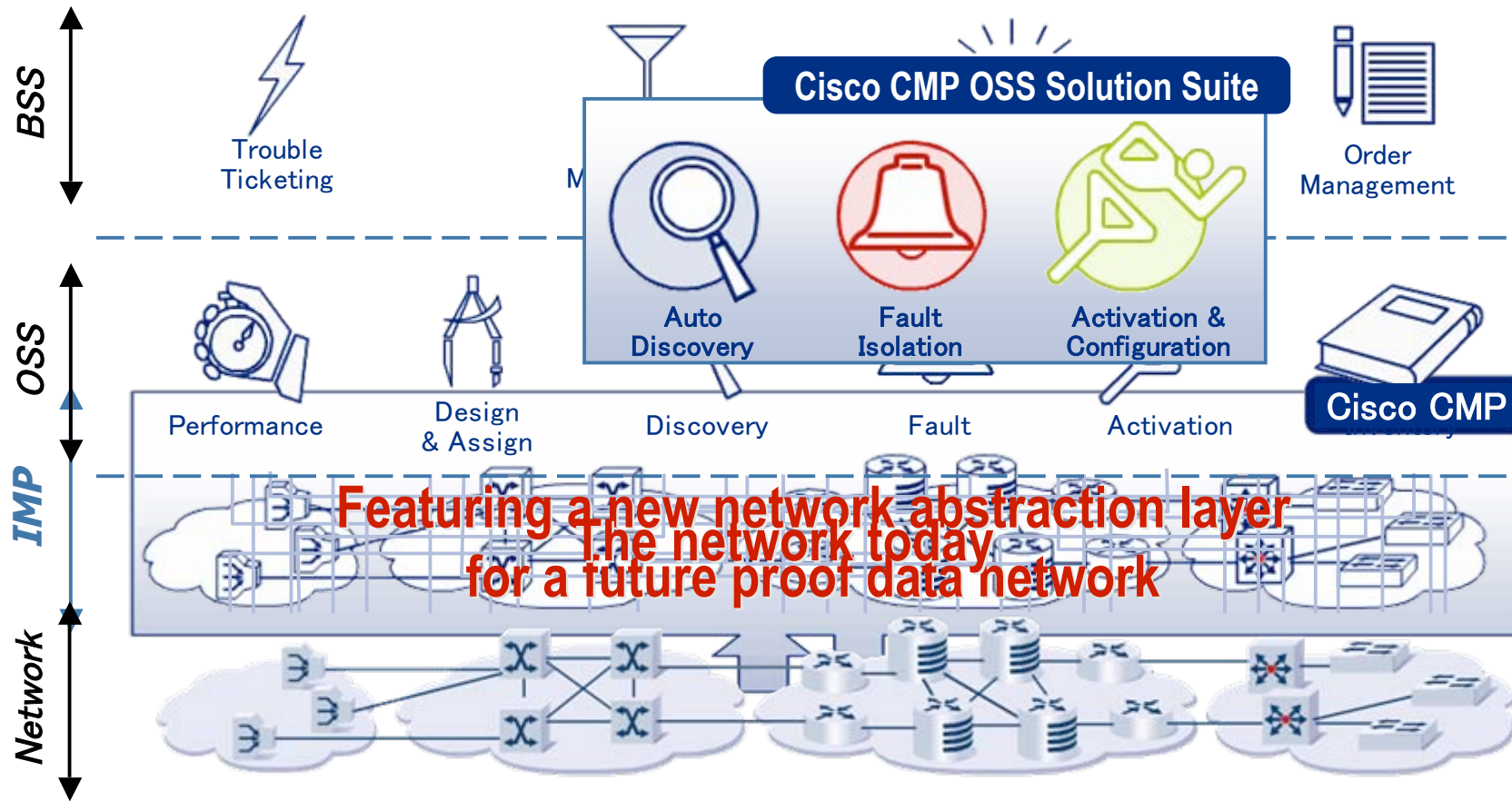


Characteristics:

- Horizontal platforms across all services
- Modular and Reusable components based on open standards
- Automated process workflow and delivery



Cisco Intelligent Management Platform Position





IP NGN is meant to drive towards ...

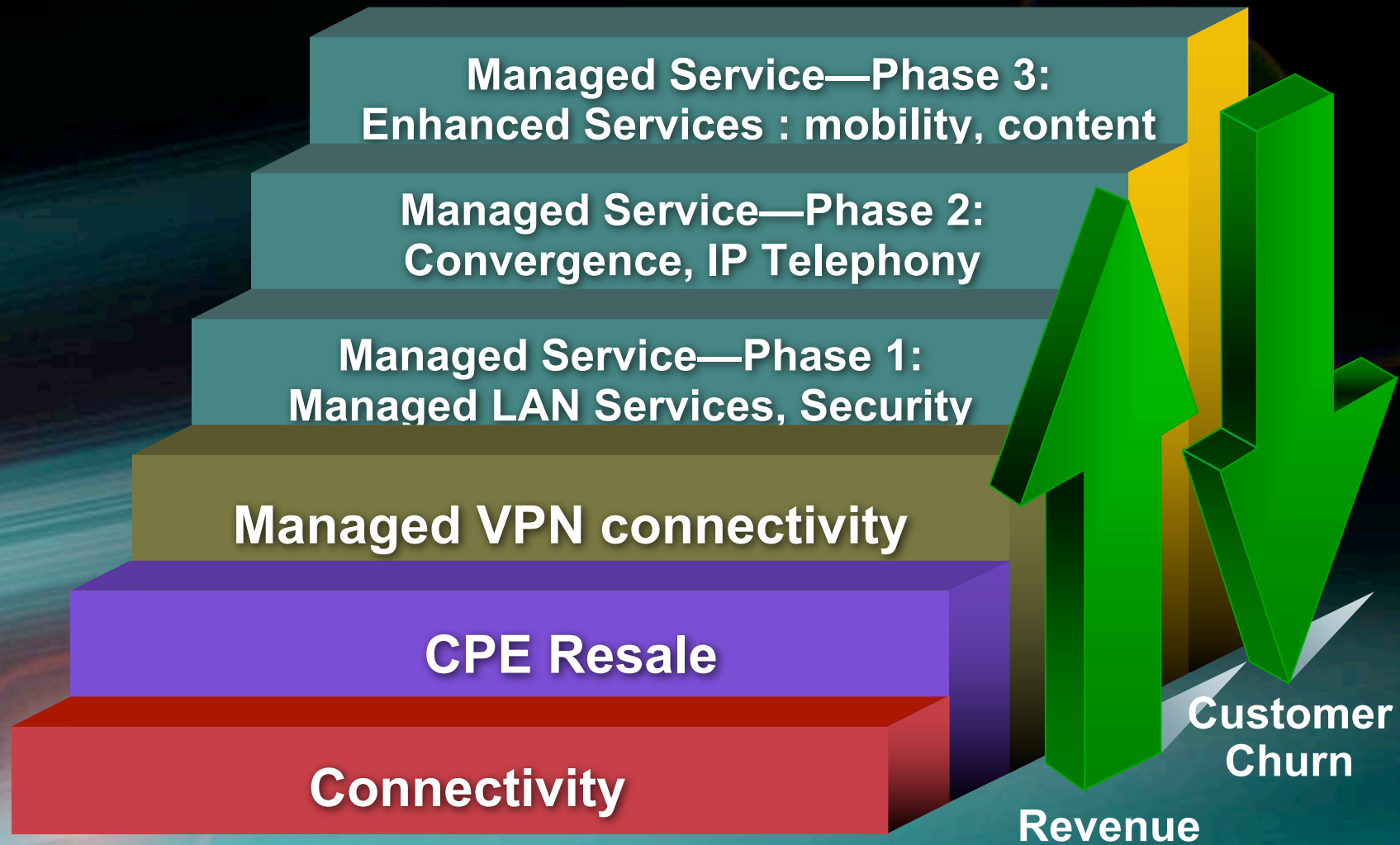


Application Convergence Layer

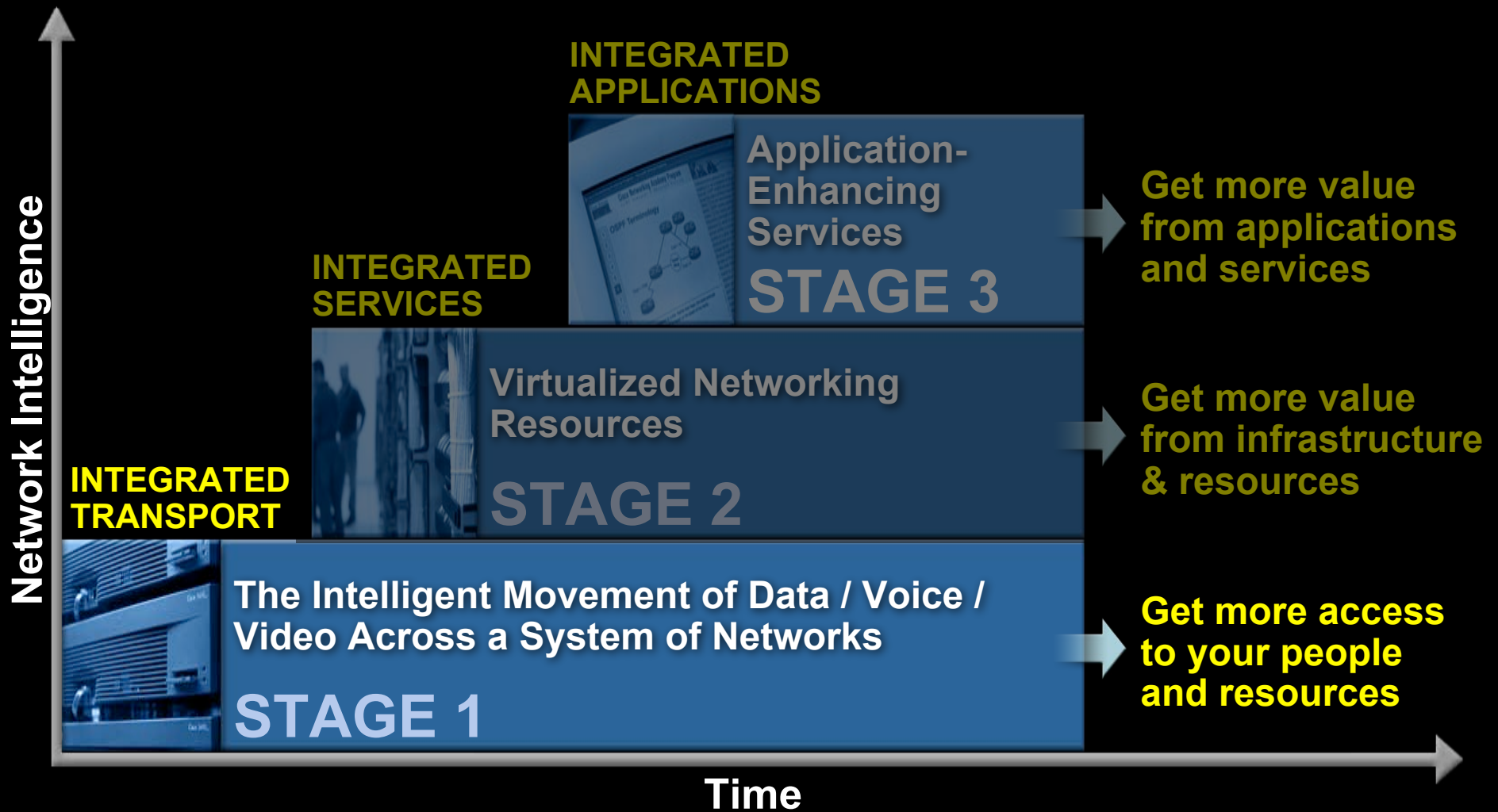




TELCO OPPORTUNITY: from managed connectivity to managed D/V/V



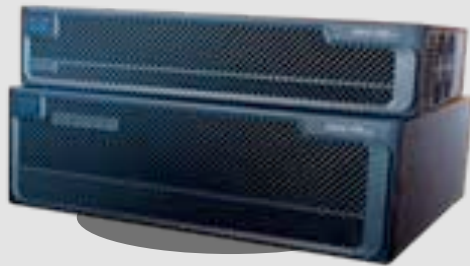
Evolution of Enterprise demand





PHASE-1: Integration and convergence

VPN, Wireless, Security and Voice through a single
Managed CPE and Broadband line



Multiservice Access Router



Voice and Security Processors

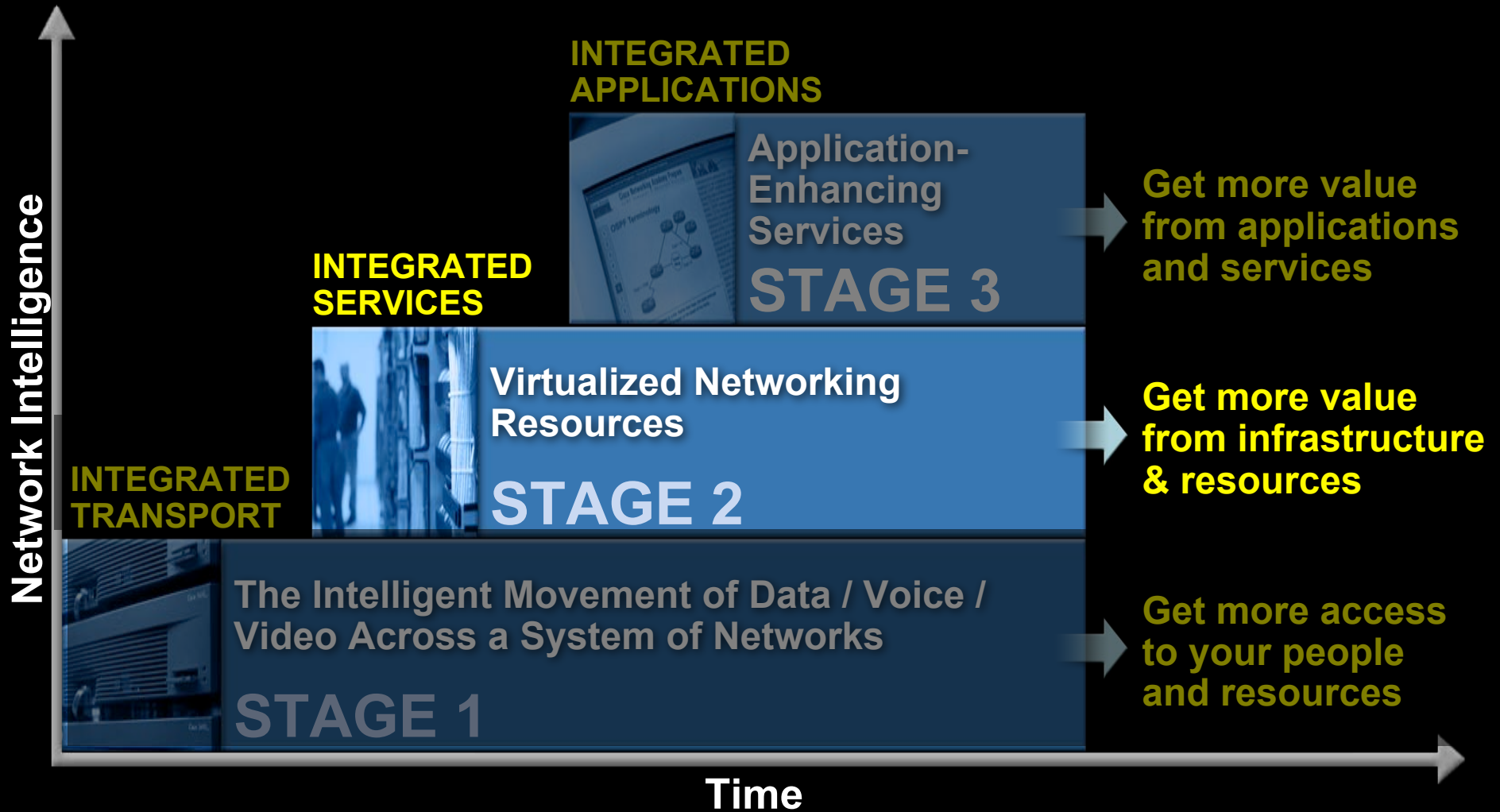


Integrated Services Routers

- Deliver secure, wire-speed, concurrent data, voice, and video
- Speed application deployment and reduce costs and complexity

➤ Unparalleled services, performance, and investment protection creates new opportunities for customers and partners

Evolution of enterprise demand



One Network, Many Uses Virtualization of Resources and Services

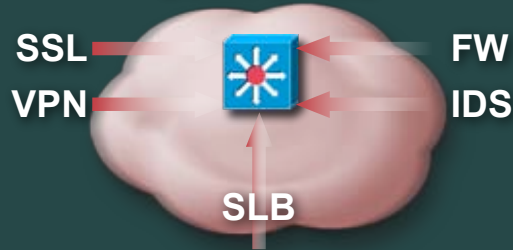


- Mode user prefers
- Priority / service level
- Anywhere, anytime
- Any network, any mode

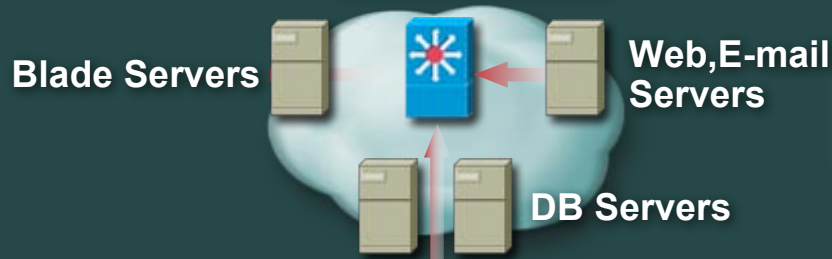
- Data / Processors / Apps
- Load balancing
- Match resources

Enterprise Architecture Evolution Data Centre of the Future

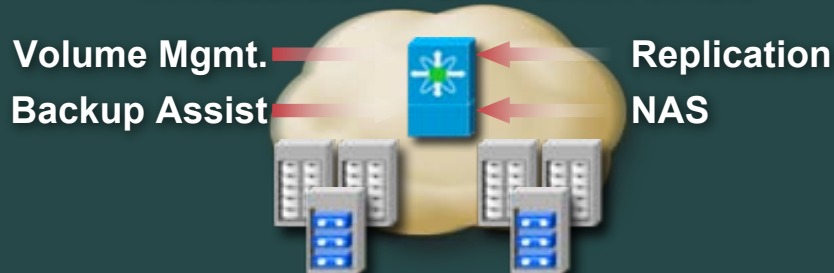
INTELLIGENT ETHERNET SWITCHES



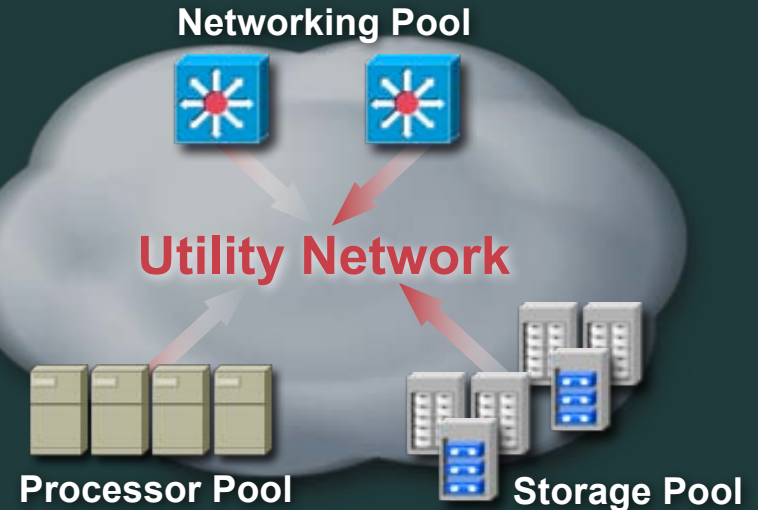
INTELLIGENT PROCESSOR SWITCHES



INTELLIGENT SAN SWITCHES

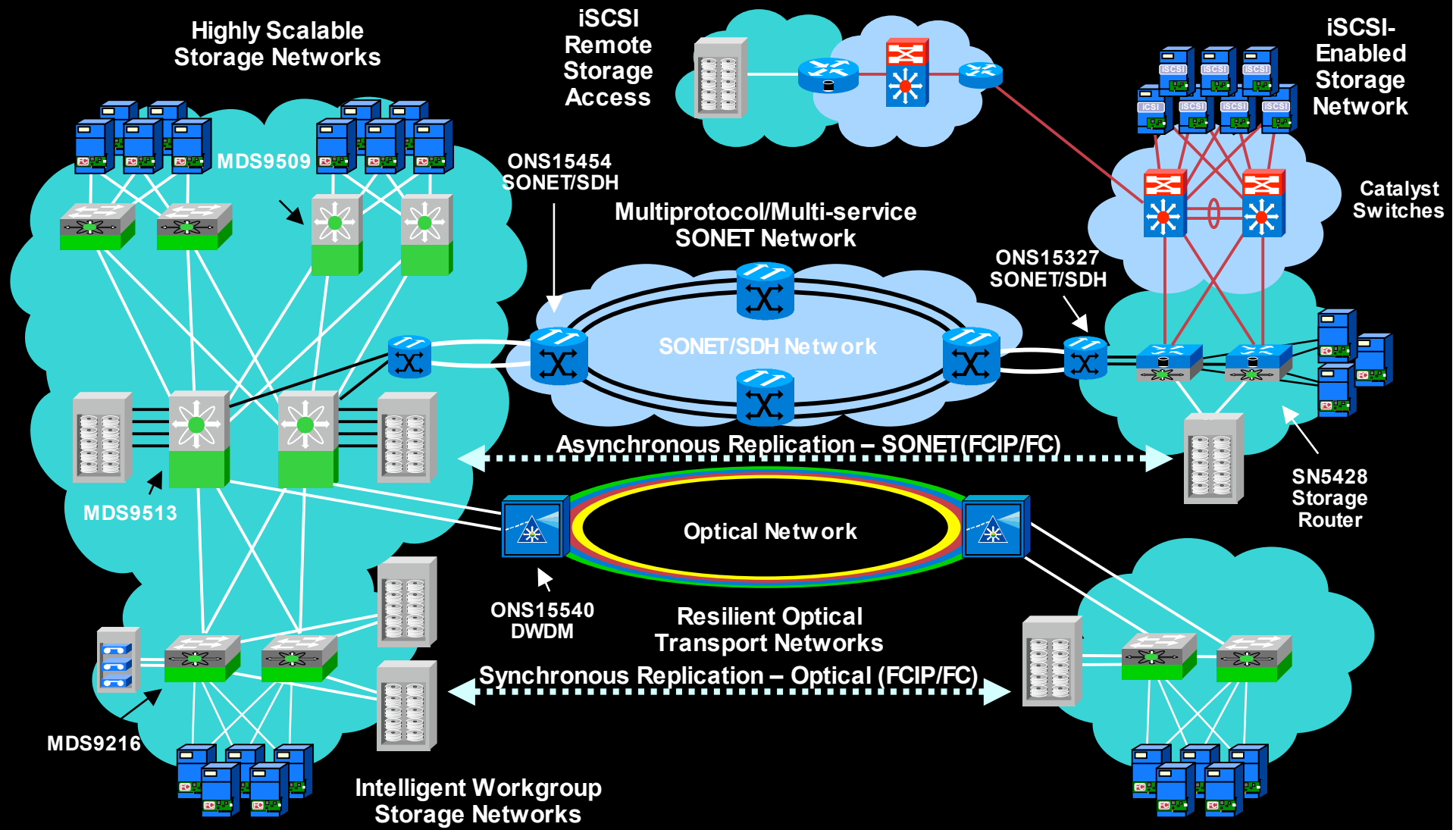


Virtual "Backplane" Between All Resources



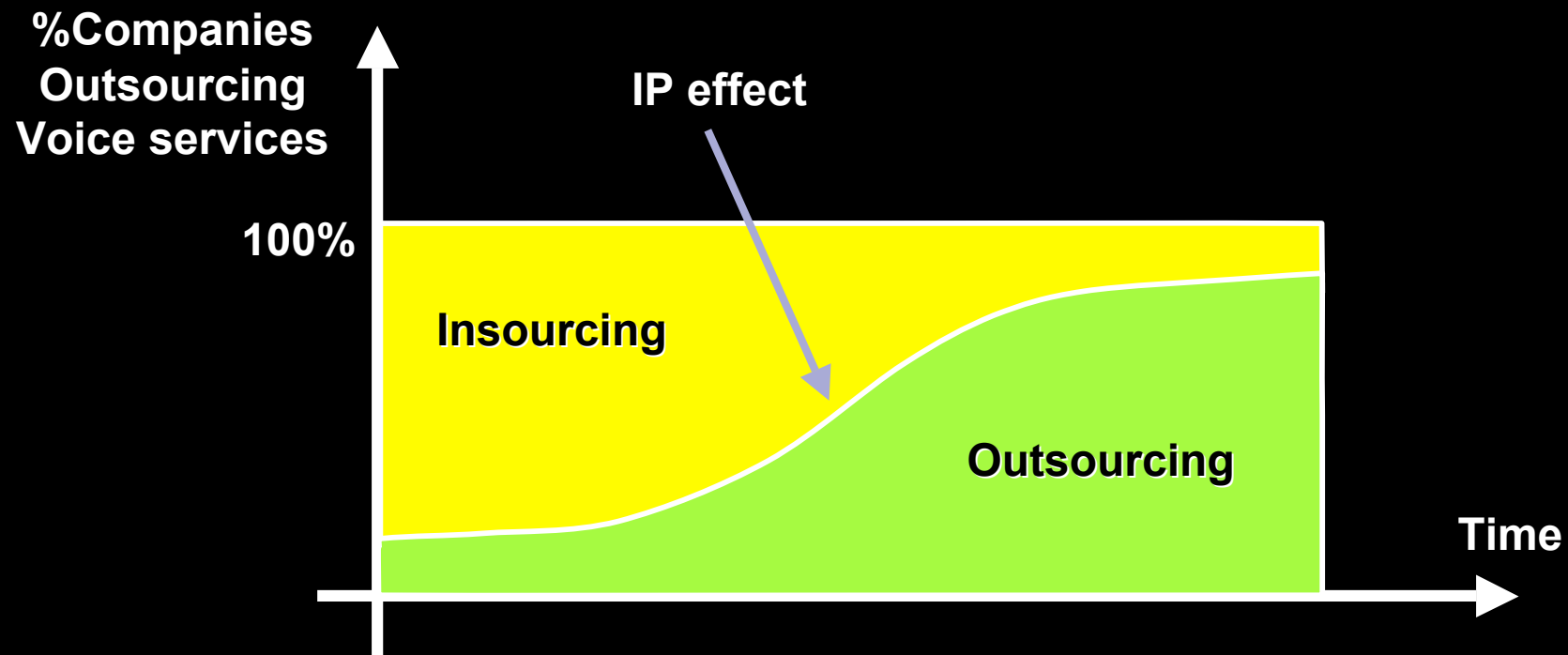
- Processor Virtualisation
- Storage Virtualisation
- File Virtualisation
- Network Virtualisation
- Service Virtualisation

Metro Ethernet resources Virtualization example: Storage over Metro optical



TELCO OPPORTUNITY – Virtualization of resources

Convergence to IP drives outsourcing of SMB and Enterprise Voice over IP VPN





Cisco SP Business Voice Solution

Enabling Business VoIP outsourcing

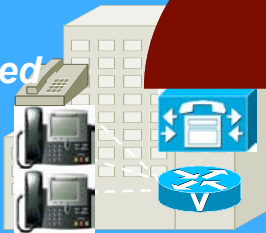
PBX trunking



Call Manager Express



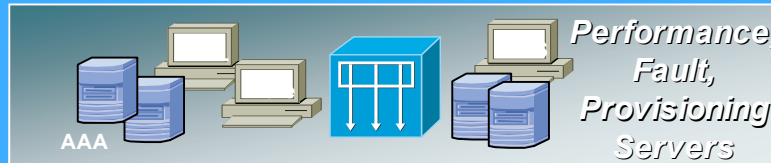
Managed CCM



Hosted CCM



H.323
MGCP
SIP



Network and Service Management

IPCC

Contact Centre



Unified Messaging/
Voice Mail



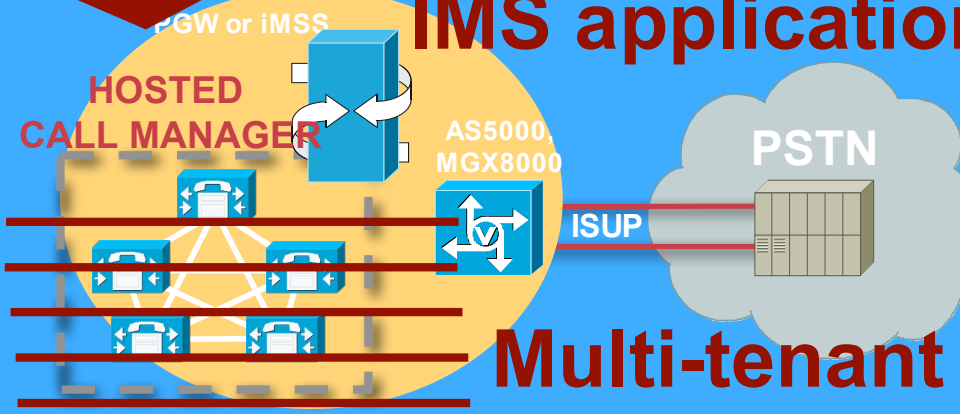
Additional Service Options



Hosted

IMS applications

HOSTED CALL MANAGER



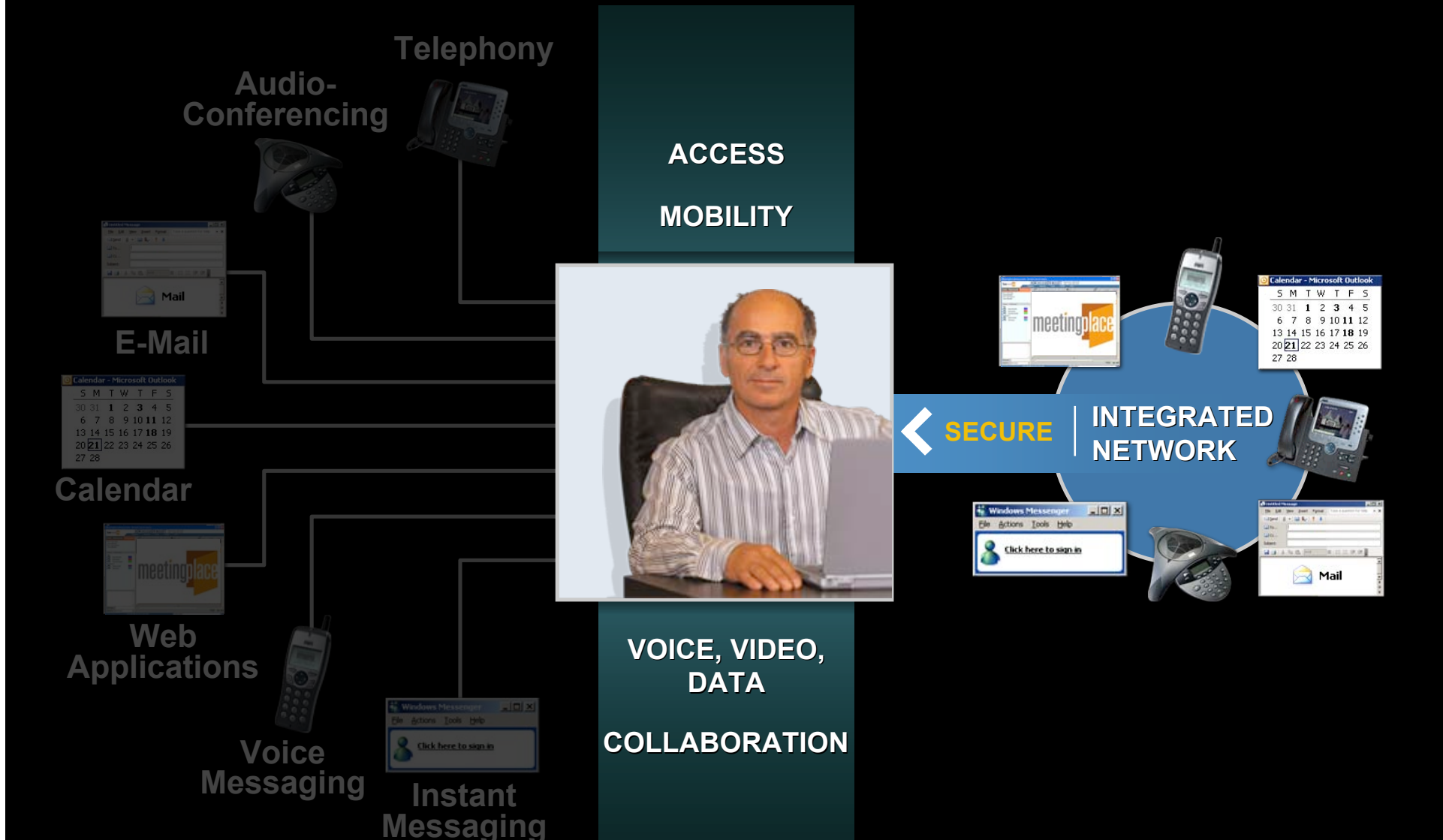
Multi-tenant

CENTRAL OFFICE

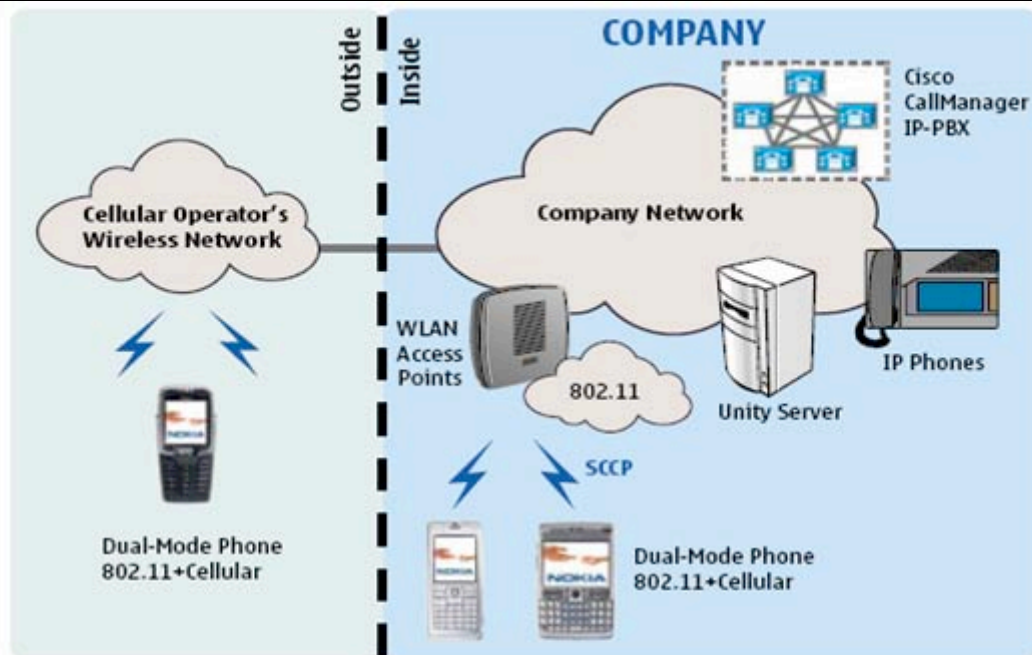


Integrated Business Voice Services

Removing the Need for "Human Middleware"



Cisco – Nokia MOBILE Business Voice solution



Solution Requirements

Supported Nokia mobile devices

- Nokia Eseries dual-mode business devices, including Nokia E60, Nokia E61, and Nokia E70 smartphones

Nokia client software

- Nokia client for Cisco CallManager or Cisco CallManager Express [SCCP and Cisco Compatible Extensions V3]

Cisco software

One of the following:

- Cisco CallManager Release 4.x
- Cisco CallManager Release 5.0
- Cisco CallManager Express Release 3.x

Cisco WLAN

- Cisco Unified WLAN infrastructure

For more information visit:

Cisco

www.cisco.com

Nokia

Americas

www.nokiausa.com/business

Asia Pacific

www.nokia-asia.com/business

Europe, Middle East and Africa

www.nokia.com/business

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FMC in the Enterprise - Teliasonera

“ The trials with Nokia and Cisco are a part of TeliaSonera's ambition to provide customers with an easy-to-use wireless VoIP concept. We are pleased to be the first operator in Europe to conduct trials in this area with two strong partners. **Simplicity, security and quality** are important aspects which will now be tested in depth together with all parties.”

**Anders Igel
CEO and President
TeliaSonera AB**



Evolution of enterprise demand

IP Networking Adoption

Cisco Application-Oriented Networking (AON)

The first network-embedded intelligent message routing system for applications

INTEGRATED APPLICATIONS

Application-Aware Network and Services

PHASE 3

INTEGRATED SERVICES

Virtualized Networking Resources

PHASE 2

INTEGRATED TRANSPORT

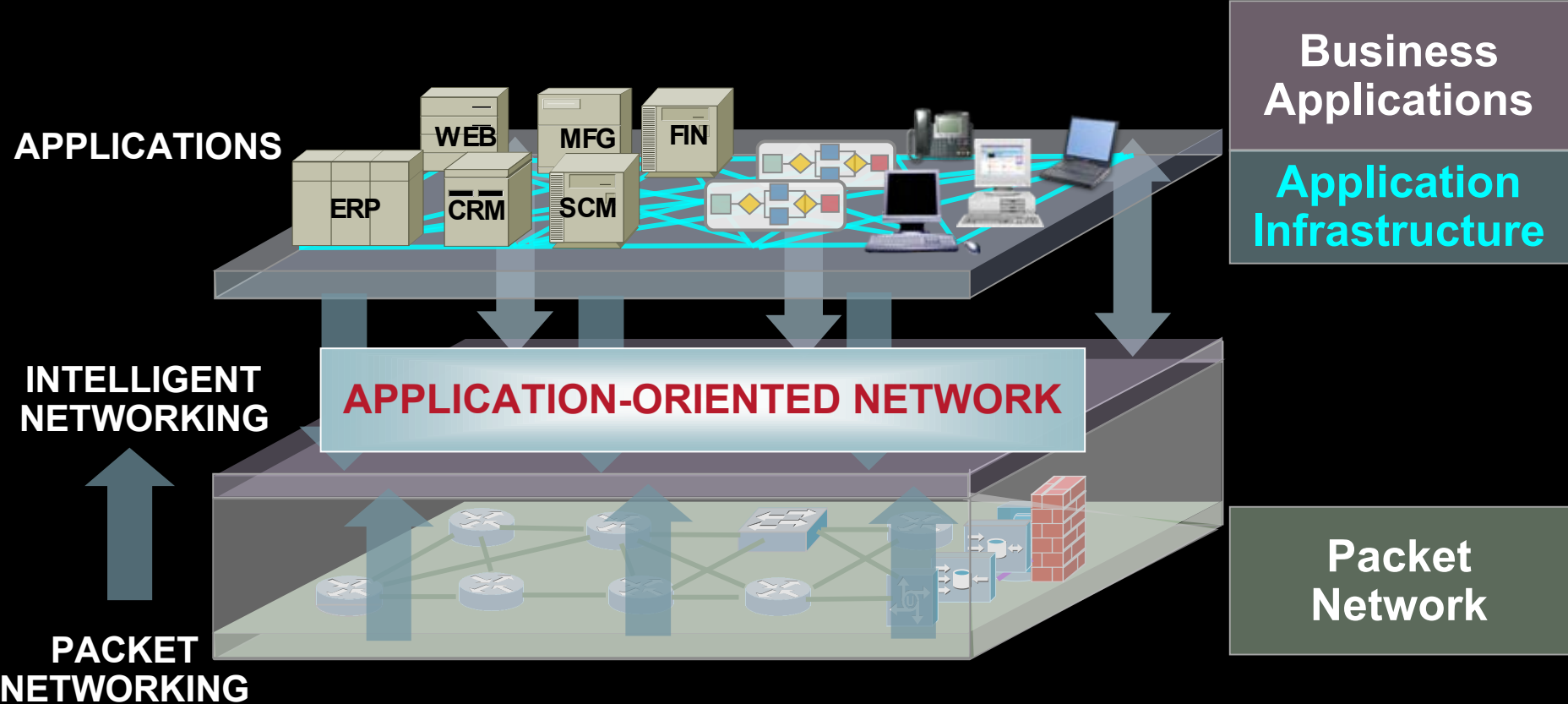
The Intelligent Movement of Data / Voice / Video Across a System of Networks

PHASE 1

Time

Integrating Applications With The Network

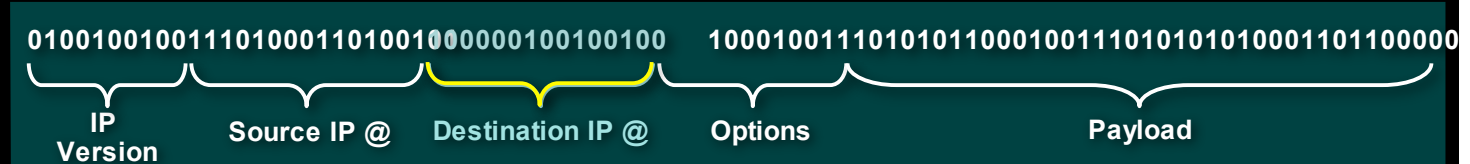
The network speaks the language of applications



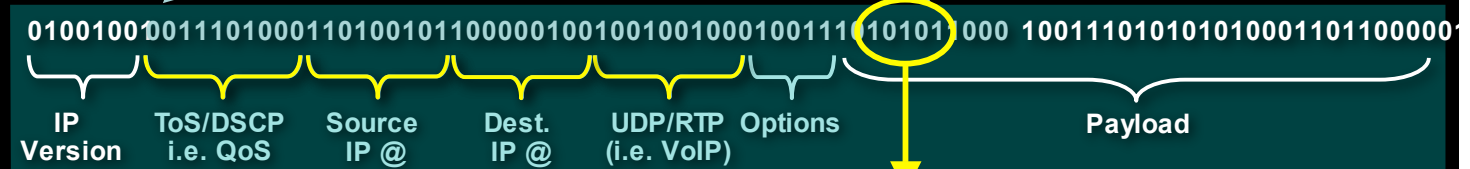


TELCO OPPORTUNITY: Participation in the Business Process

Simple Forwarding Paradigm with Optimized Performance...

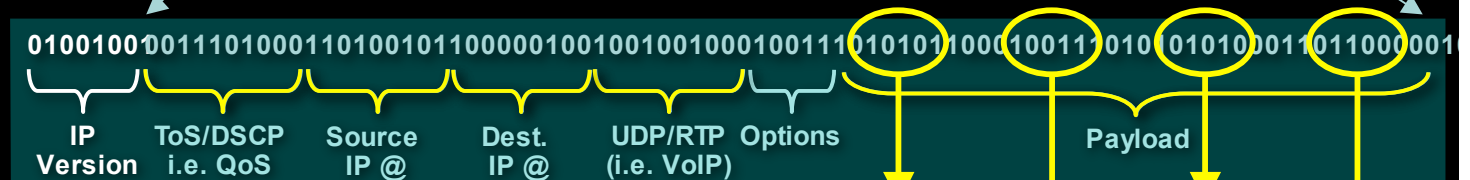


Intelligent Forwarding Paradigm, Optimized for Service Creation



e.g., HTML via NBAR

Payload Inspection, With Flexible Policies



e.g., XML

SOAP

HTML

SQL*Net



AON Benefits Across Industries



Financial Services

Retail

Logistics/ Transportation

Government

Financial Services Service Provider:
Managed FIX
Message Services

Investment Bank:
Trade Settlement
Messaging Hub

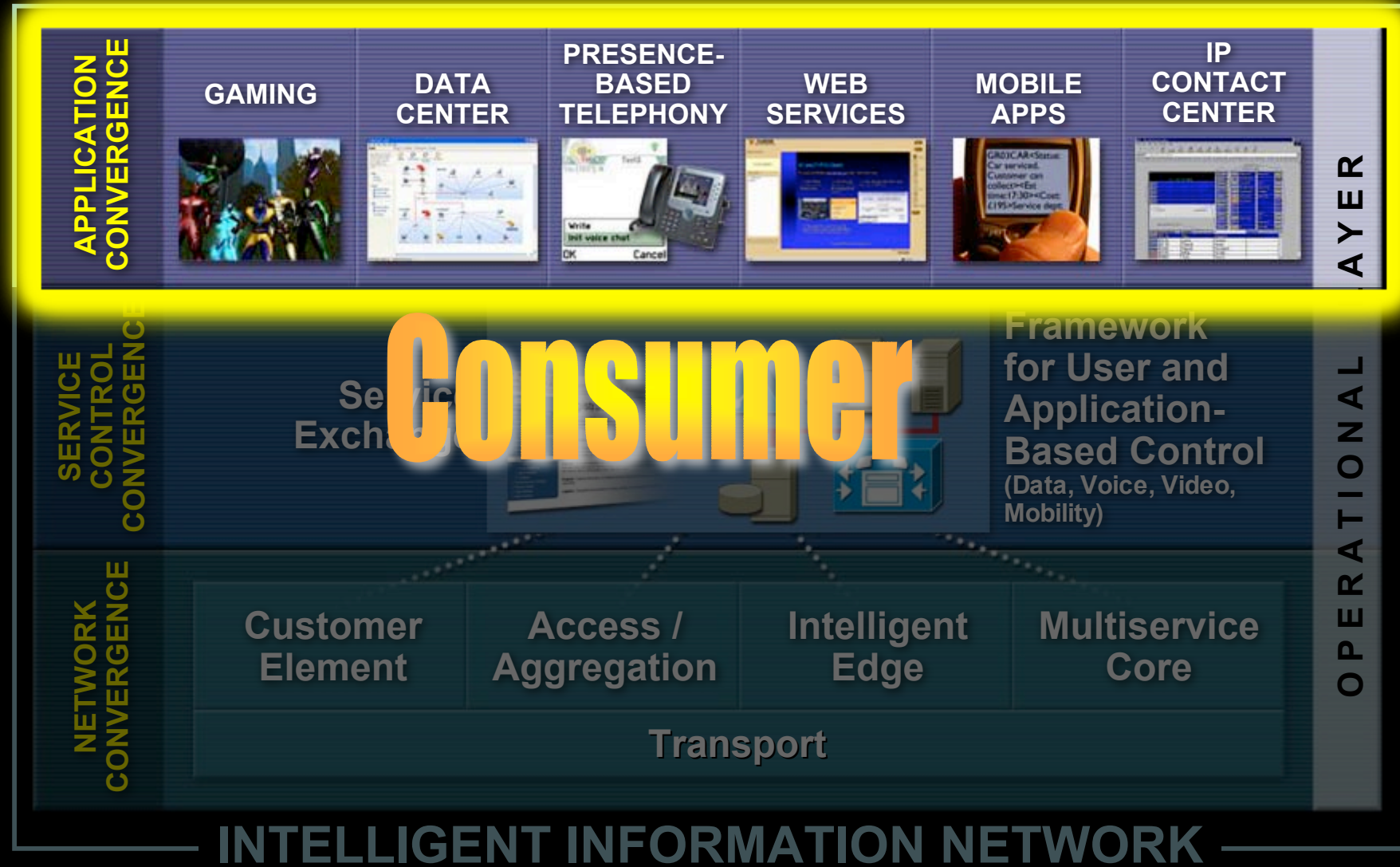
Stock Exchange:
CPE for Integration
of Member Banks

RFID Edge Device:
Aggregation and
Filtering of RFID
Messages

Global Logistics Company:
Visibility into
Aggregate Traffic
and SLA Monitoring
for Enterprise
Customers

Intelligence Agencies:
SOA-based
Integration of
Information
across multiple
Organizations

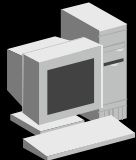







Application Convergence Layer





The Experience Provider: One Simple Vision Connecting Your Life

The “Connected Home” Is Shaping the Broadband Vision

Home Security Systems 	Tri-Band Mobile Phone 	PC and Laptop 	Utility Meters 	Digital TV / VoD 	Video Phone 	HD/ PVR 	Hand-held PDA 	802.11 Handset 	MP3 Music 	Gaming 
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Cisco’s IP NGN Enables the Connected Home

Communication



Information



Entertainment

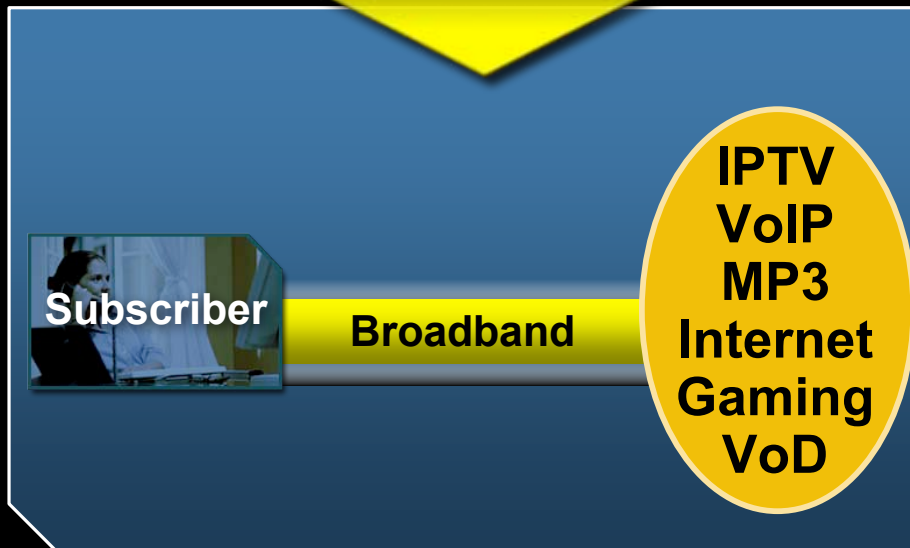
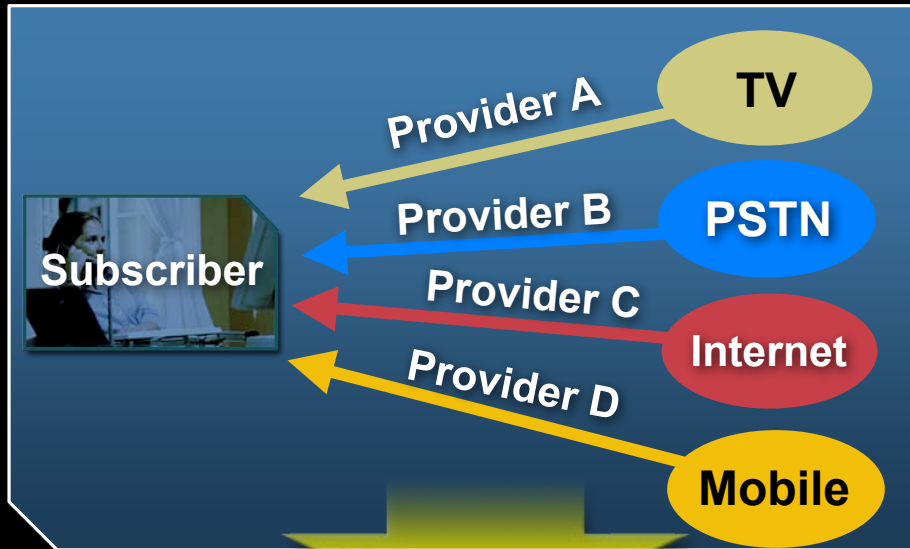


Telecommuting



Service Provider Dynamics

Broadband Defining New Service Models



“For each added service a customer takes ..., annual likelihood of defection typically drops by **30% or more.**”

Gartner Group, Jan. 2001

Data-only churn	1.6%
Two-service churn	1.1%
Triple-play churn	0.8%

Joe Rooney, VP Marketing, Cox

WCS Dec. 2001

Confirmed also by FastWEB and other triple play providers



Consumer Needs Are Evolving Beyond Connectivity: Requires Integrated Voice / Video / Data with Mobility

Physical and Social Context Determines the Application Mix Used

Home Office / VPN



Online Gaming



IM / Group Chat



Internet Access



IPTV/VoD



IP NGN Infrastructure

- **Subscriber Personalization:**
Actively manage the subscribers identity and adjust the service offering/packaging (i.e., different identity in different worlds)
- **Mass Scalability:**
Leverage mass-customization principles:
Service-bundling; subscriber-grouping and per-group processing
- **Service Evolution:**
From transport-based service models (time/distance/volume) to content-based service models

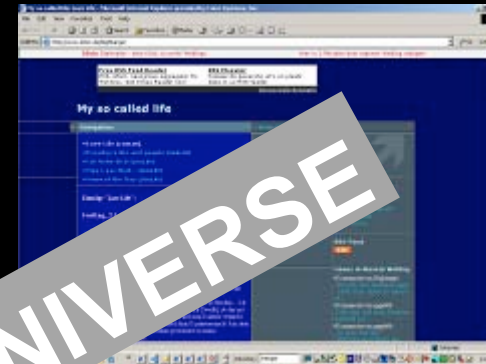


The New Consumer Behavior

Expressing identity



Online Gaming and Communities



BLOGS



Specific Knowledge



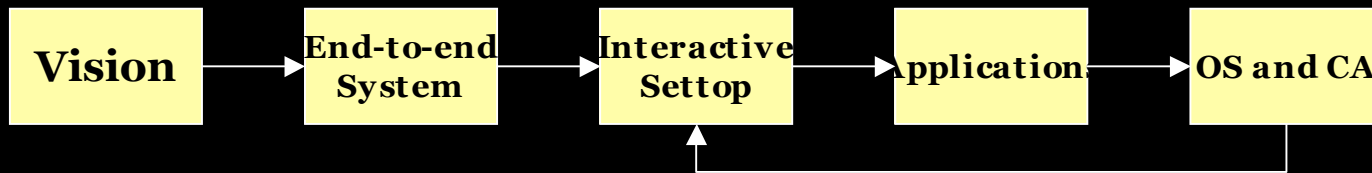
Customized Content – i.e. PODCASTING

Creating our own UNIVERSE

1) HIGH AVAILABILITY: What happens if the screen goes blank during the World Cup?

Interactive Video systems are not “Easy”

Cisco &
Scientific
Atlanta



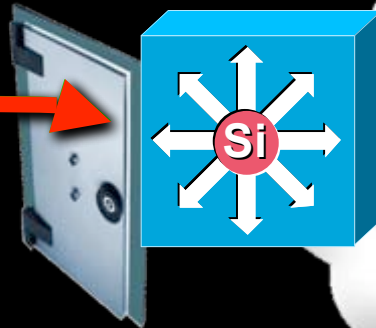
New
Entrants



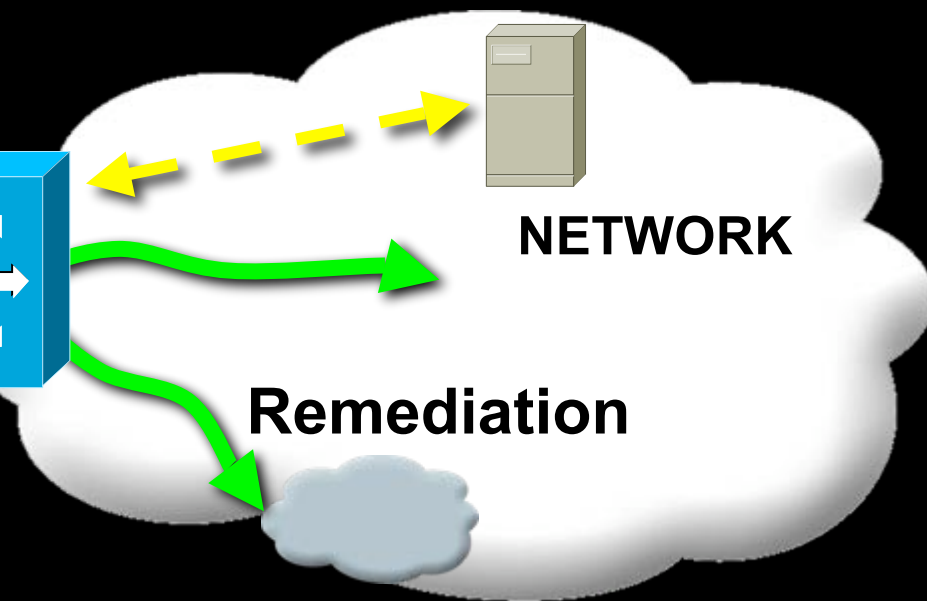
Domain
integration skills
are critical

2) SERVICE SECURITY: Cisco Network Admission Control

Client Attempts Connection



Authentication and Policy Check of Client



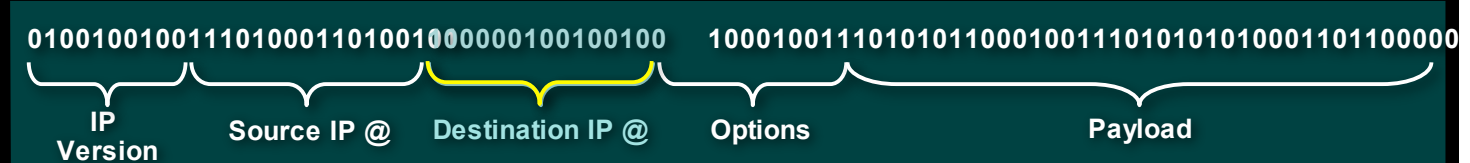
Quarantine VLAN

- Access granted
- Access denied
- Quarantine remediation

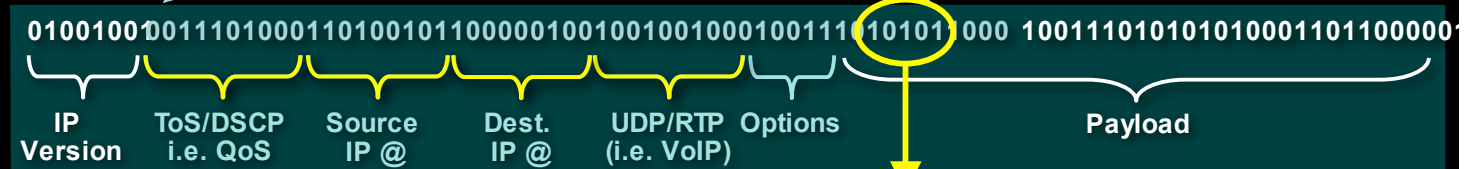


3) APPLICATION AWARENESS: services invoked for specific applications and users

Simple Forwarding Paradigm with Optimized Performance...

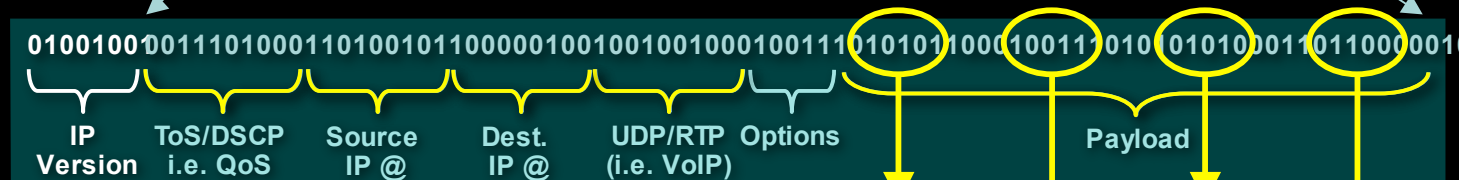


Intelligent Forwarding Paradigm, Optimized for Service Creation



e.g., HTML via NBAR

Payload Inspection, With Flexible Policies



e.g., XML

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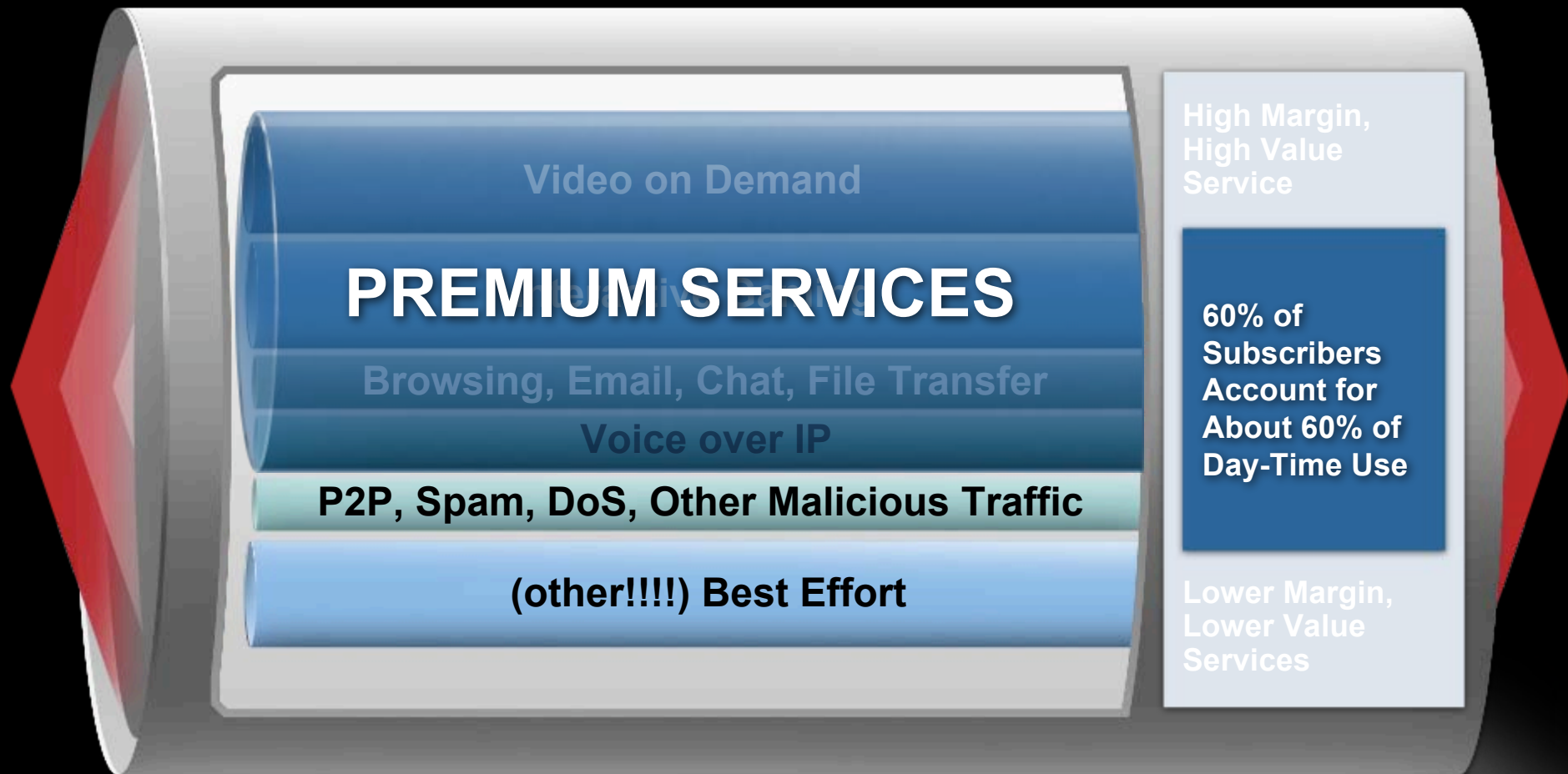
HTML

SQL*Net



Application Awareness brings Service Differentiation

DEFINE, ENFORCE, AND BILL FOR SERVICE OFFERINGS





Deliver Value-added Triple Play Services

Grow Revenue

ADD SERVICES

ADD VALUE

ADD SUBSCRIBERS

 <p>Branded VoD (\$4.99/movie)</p>	 <p>Branded TV (\$29.99)</p>	 <p>Branded Phone (\$15.99 + LD)</p>
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<p>✓ Parental-Control (\$5.99)</p>	<p>✓ Anti-SPAM (\$5.99)</p>	<p>✓ Anti-DoS (\$5.99)</p>
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<p>Broadband Light \$19.99</p>	<p>Broadband 4 Kids \$24.99</p>	<p>Broadband Basic \$29.99</p>	<p>Broadband Advanced \$39.99</p>	<p>Broadband Business \$49.99</p>
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Quad-Play Services

Wireless and Wireline Integration



TV on your phone

Sprint and the cable partners will provide their joint customers with integrated wireline and wireless communications and entertainment products anytime, anywhere. Watch shows in real time on your handset.

Select a channel to watch a show.



- Agreement between Sprint, Cox, Comcast and Time Warner to provide Quad-play services
 - Integrated 3G access to TV Channels and DVR content
 - Email and Voicemail
 - Voice over IP/3G
 - Each operator retains customer control



IPTV: Market snapshot

- The market of “premium” IPTV channels is **2M** subscribers (end of 2005)
- Very large number of IPTV trials underway
- Few “large” deployments in production since 2+ years: **PCCW, FastWEB, Free, France Telecom, Telefonica, Neuf Telecom, HKBB, Sasktel, ...**
- Only **5 deployments have more than 100,000 paying subscribers**
- The largest deployment of **VoD is in the Cable** industry (Comcast = 1.5 Billion VoD streams in 2005)
- Very fragmented Vendor market, posed for **consolidation**



More than TWO THIRDS of all Carrier Ethernet products for IPTV and Business services come from Cisco



Press Release

Source: Cisco Systems, Inc.

Leading Industry Analysts Confirm Cisco's Carrier Ethernet Leadership in Digital Video/IPTV and Business Services Segments

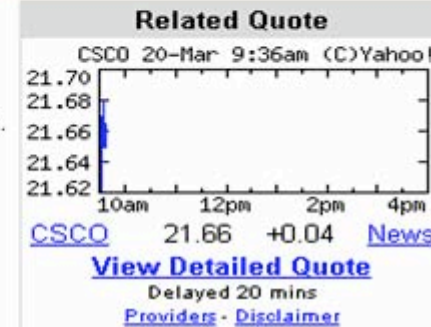
Monday March 20, 8:00 am ET

LAS VEGAS--(BUSINESS WIRE)--March 20, 2006--Cisco Systems® (NASDAQ:[CSCO](#) - [News](#)) today announced that leading industry analyst firms IDC, Infonetics and Ovum-RHK have each estimated that **over two-thirds of all products shipped in the new Carrier Ethernet routing and switching segment come from Cisco.**

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Options \$0.50 - \$0.75 per contract (all-in)	Stocks \$0.005 or less per share (all-in)
Futures \$0.25 - \$1.20 per contract (plus execution fees)	Forex 1-2 pip wide EURO/USD spreads

IPTV and video-service delivery is driving changes at the broadband network edge, making it the foundation for delivering triple play services. Video delivery requires scalability, advanced subscriber management, policy control and application-level quality of service (QoS). Cisco's IP Next Generation Network (IP NGN) architecture is designed to help service providers innovate and offer them the flexibility they need to meet the demands of



- Related News Stories**
- [Cbeyond Communications Driving Rapid Growth of Managed IP Communications Solution Among Small Businesses](#) - Business Wire (8:00 am)
 - [Covad Adds More Than 580 New Business Customers for Managed IP Communications Service Based on Cisco Solutions](#) - Business Wire (8:00 am)
 - [Mobile extras may not attract US consumers-survey](#) - at Reuters (1:01 am)
 - [\[\\$\\$\] Silicon Valley Start-Ups See Cash Everywhere](#) - at The



Cisco Experience

Announced Video/IPTV over IP NGN Deployments

- **>10 M Video/IPTV Subscribers Deployed Worldwide**
- **>1.5 B IPTV VOD streams carried on Cisco networks this year.**



CRS-1 & Metro Ethernet
for BB content & services



Early Wireline
Video Adopter



Hong Kong BB—
Gigabit and IPTV to home



70 Channel IPTV
10 Million reach in U.K.



Triple play on
Fiber to Home



Largest Broadband Metro E
for Triple Play - Priming / SI



50%+ coverage in France
Wholesale to CanalSat & TPSL



Leading IPTV / 3P in Europe
600K+ IPTV users



First to offer
IPTV in Canada



MSO Innovator
Leading Triple



Play
Voice, 155 channel video,
data service in Spain



Digital TV, voice,
Cisco Powered Network

Cisco & Scientific Atlanta

- World's largest Video/IPTV networks run on the combined company's infrastructure.
- Over 22 Million Explorer Digital STBs shipped
- Over 50 M Homes Passed with Over 240 Video Headends deployed globally



Over The Top Video Solutions Are Gaining Traction With Consumers

- 8 million videos purchased from iTunes in first three months of service
- Over 5 million unique viewers of Live8 on AOL in Summer 2005
- 6.5 million Media Center PCs have shipped to date
- Video blogs are gaining audiences (e.g., Rocketboom newscast reaches 130,000 daily viewers online and via TiVo)
- Mania TV, an Internet-based television network, draws 2 million visitors per month
- A typical Akamai client's streaming traffic doubles every 6 to 8 months (source: Forrester)
- Google Video Beta launched in 2006





Broadcasters seeking and exploring new distribution channels

your
the m
cable
email
read.

The f
you t
often
can r
imme

Oppo
• *Hea*
• *Ind*
Adve
• *Bar*

NEWSWRAP

BSkyB to offer movie downloads

BSkyB has taken its first significant step into the world of broadband distribution with the launch of two new services, Sky By Broadband and Sky By Mobile.

The UK pay-TV operator will allow subscribers to its movie and sports packages to download from a selection of about 200 movies to a designated PC in the home at no extra cost. They will also be allowed to download from a selection of about 1,000 highlights and other clips from **Sky Sports**, including highlights of **Barclays Premiership** and **UEFA Champions League** matches. The company hopes to increase the number of movies on offer to about 1,000 over time. Sky also intends to develop a package of content from its **Sky One** general entertainment channel for the service.

"As long as you take the appropriate Sky Digital package you can pay an additional fee," said **Richard Freudenstein**, chief operating officer. The mobile service will give Sky Digital and Sky Bet customers access to the networks, arranged in five thematic sections. Sky Bet customers can watch and place bets. A further option to view Sky TV by mobile, currently available on the UK 3G networks from April. Sky also intends to allow its Sky Plus PVR set-tops to record programmes via their

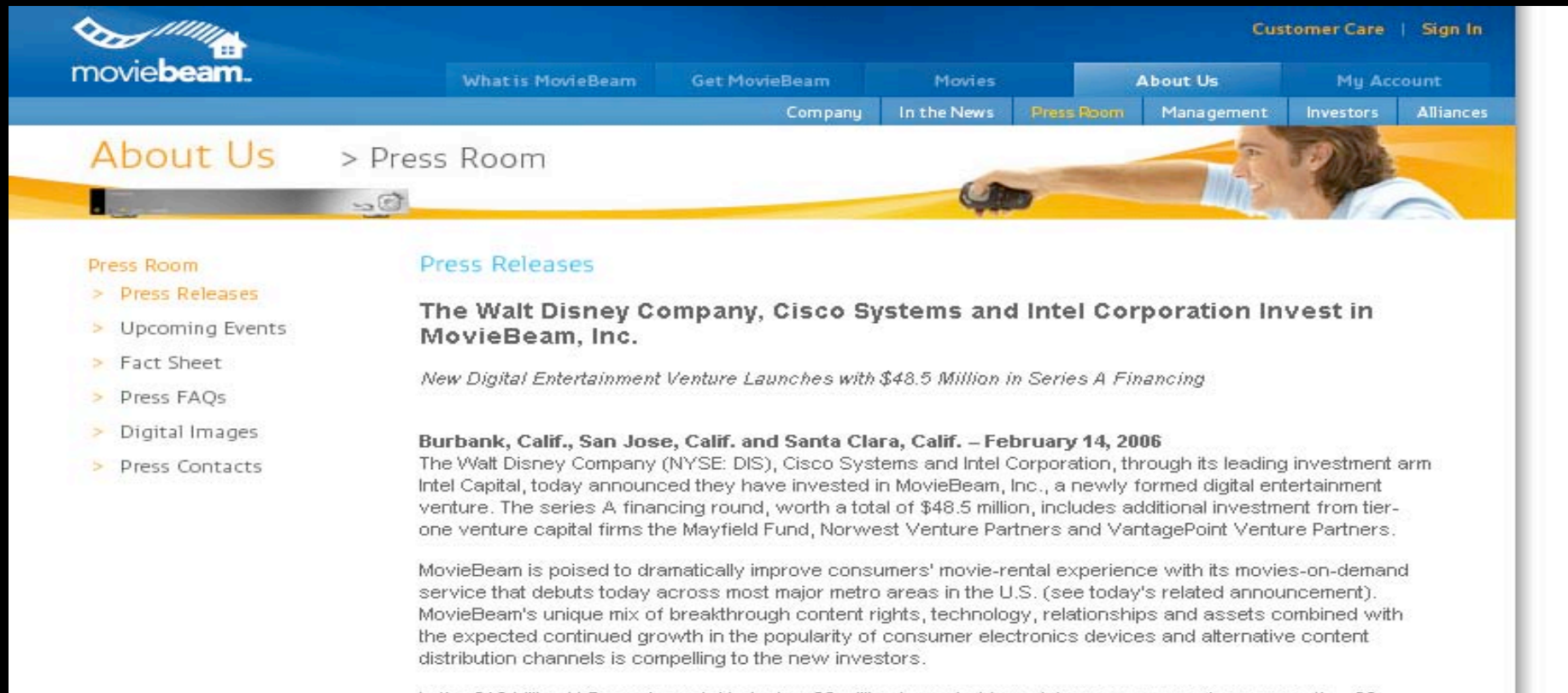
SKY

- Focused management team
- Existing business in satellite distribution and channels
- Expertise in high volume customer relationship management and support
- Consumer brand marketing expertise
- Broadband portal

EASYNET

- Focused management team
- Existing business in high speed data
- Pioneer in local loop unbundling
- Nationwide network infrastructure
- Expertise in broadband service provision and managing high speed data flows
- Relationship with BT Wholesale

Walt Disney + Linksys



The screenshot shows the MovieBeam website's press room page. The top navigation bar includes links for 'Customer Care | Sign In', 'What is MovieBeam', 'Get MovieBeam', 'Movies', 'About Us', and 'My Account'. The 'About Us' section is expanded to show 'Company', 'In the News', 'Press Room', 'Management', 'Investors', and 'Alliances'. The main content area features a navigation menu on the left with links to 'Press Room', 'Press Releases', 'Upcoming Events', 'Fact Sheet', 'Press FAQs', 'Digital Images', and 'Press Contacts'. The main text area is titled 'Press Releases' and contains a press release dated February 14, 2006, from Burbank, Calif., San Jose, Calif., and Santa Clara, Calif. The release title is 'The Walt Disney Company, Cisco Systems and Intel Corporation Invest in MovieBeam, Inc.' and the sub-headline is 'New Digital Entertainment Venture Launches with \$48.5 Million in Series A Financing'. The body text describes the investment and the company's mission.

Press Room

- > **Press Releases**
- > Upcoming Events
- > Fact Sheet
- > Press FAQs
- > Digital Images
- > Press Contacts

Press Releases

The Walt Disney Company, Cisco Systems and Intel Corporation Invest in MovieBeam, Inc.

New Digital Entertainment Venture Launches with \$48.5 Million in Series A Financing

Burbank, Calif., San Jose, Calif. and Santa Clara, Calif. – February 14, 2006

The Walt Disney Company (NYSE: DIS), Cisco Systems and Intel Corporation, through its leading investment arm Intel Capital, today announced they have invested in MovieBeam, Inc., a newly formed digital entertainment venture. The series A financing round, worth a total of \$48.5 million, includes additional investment from tier-one venture capital firms the Mayfield Fund, Norwest Venture Partners and VantagePoint Venture Partners.

MovieBeam is poised to dramatically improve consumers' movie-rental experience with its movies-on-demand service that debuts today across most major metro areas in the U.S. (see today's related announcement). MovieBeam's unique mix of breakthrough content rights, technology, relationships and assets combined with the expected continued growth in the popularity of consumer electronics devices and alternative content distribution channels is compelling to the new investors.

Movies are beamed wirelessly into homes via over-the-air signals of local ABC and PBS affiliates using MovieBeam's patented digital signal to set-tops outfitted with hard drive

Democracy YouTube, myspace.com

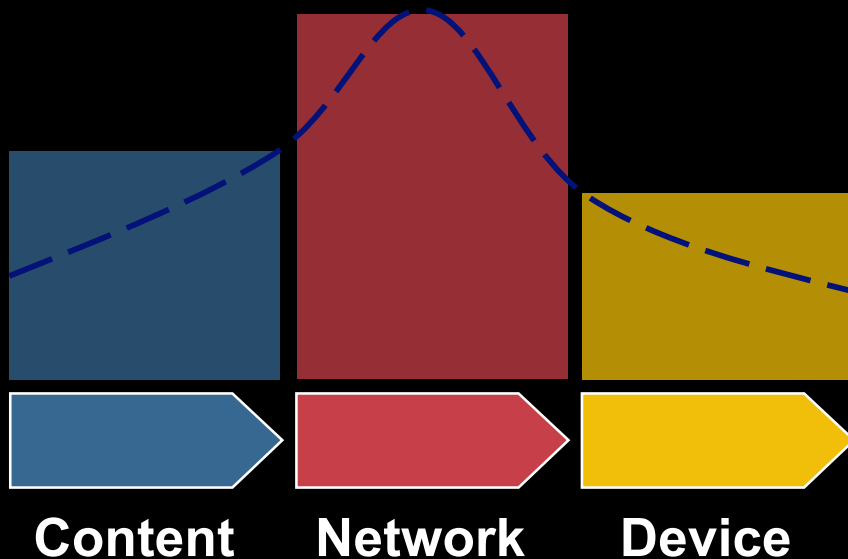
- "Democracy" Video Player Offer Open Source, BitTorrent-like PVR
The Participatory Culture Foundation, a non-profit organization whose mission is "to create tools for broader, deeper engagement with culture and politics," released an open source Internet TV system designed as an alternative to proprietary video players.



The value capture elements of the value chain are shifting...

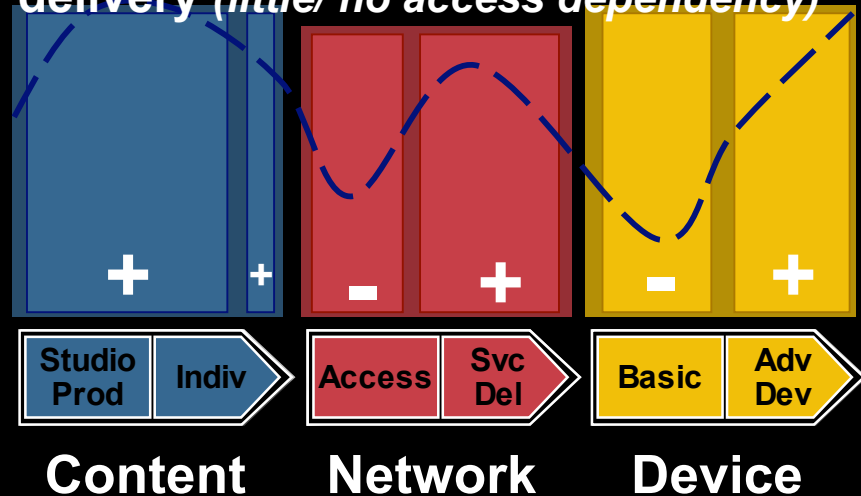
Old Paradigm

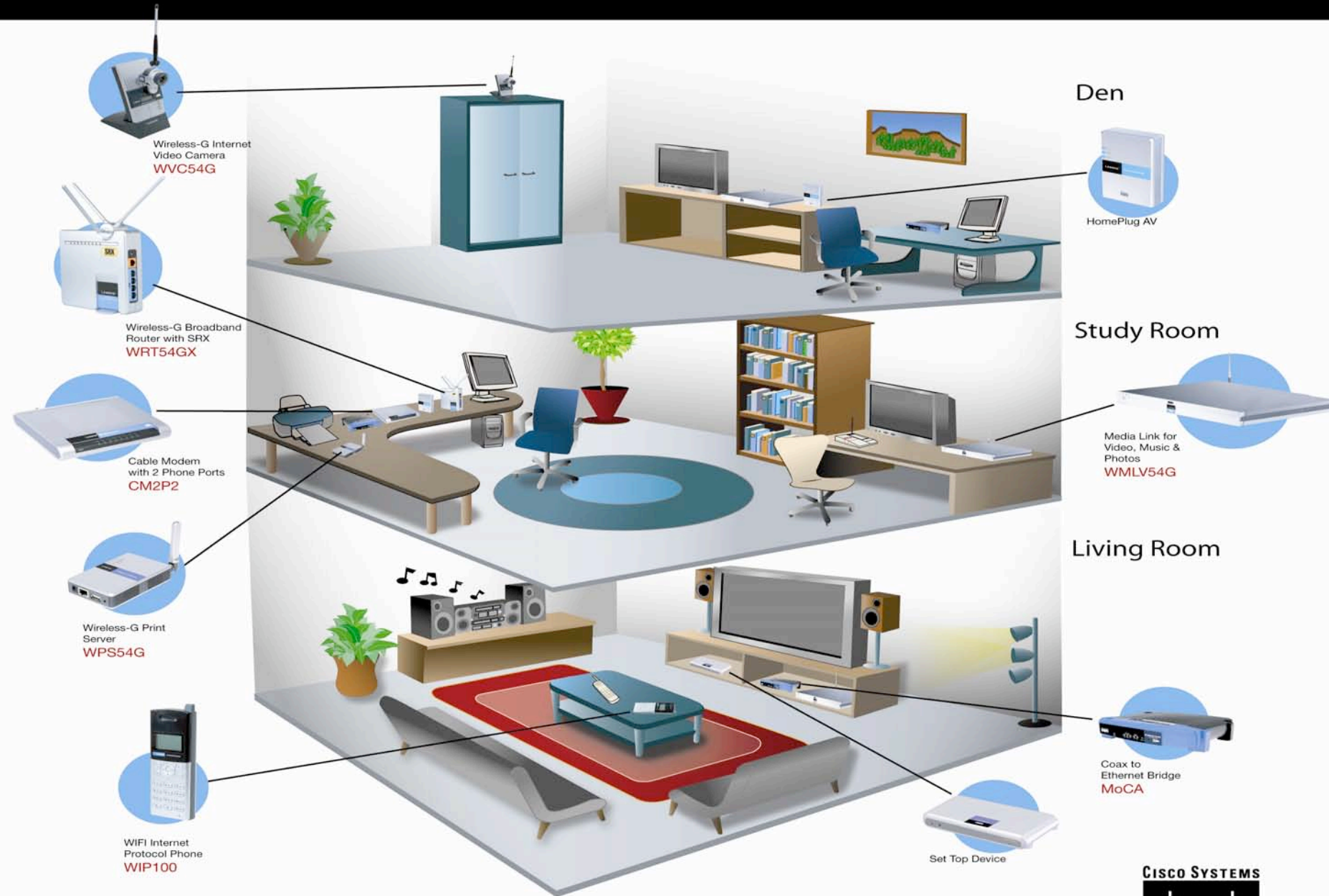
- Network and content have tight relationships
 - Vertical integration
 - Existing contractual relationships
- Devices are an extension of the network



New Paradigm

- Content ownership becomes differentiator for network operators
- Non-real-time video delivery deemphasizes access
- Service control and features becomes primary source of differentiation
- Devices are an extension of service delivery (*little/ no access dependency*)





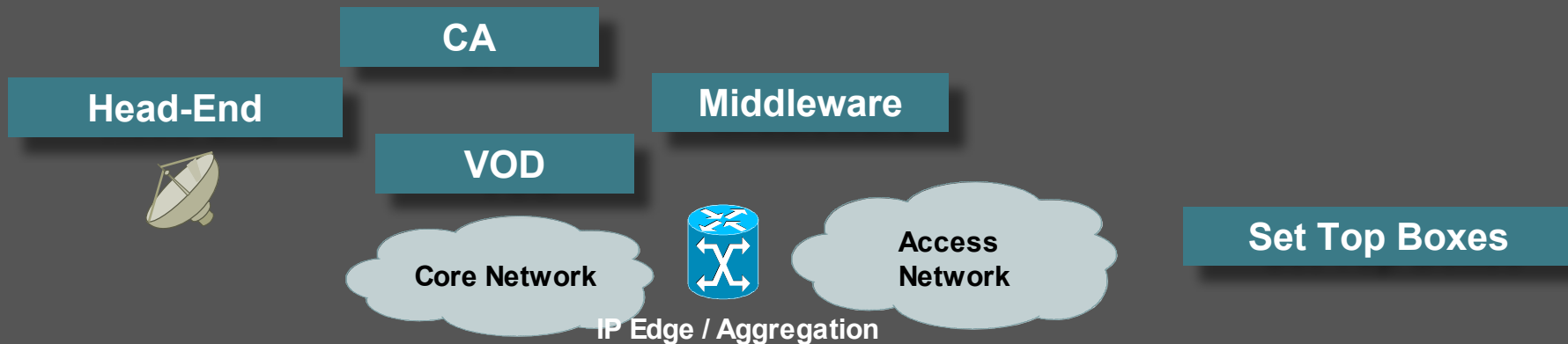
IPTV Building Blocks and Players / Partners

Services

System Integrators

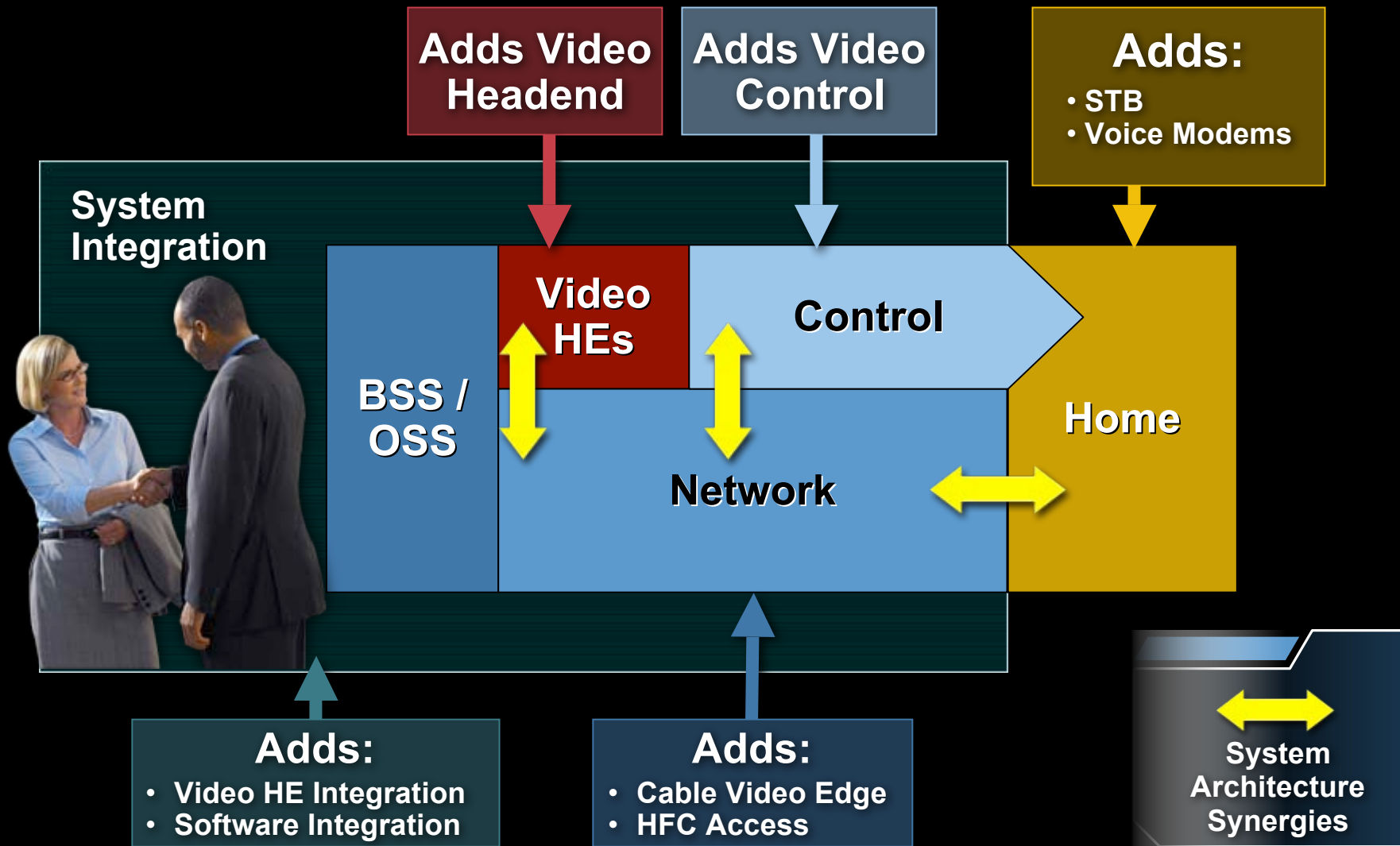
Network Integrators

Video Integrators



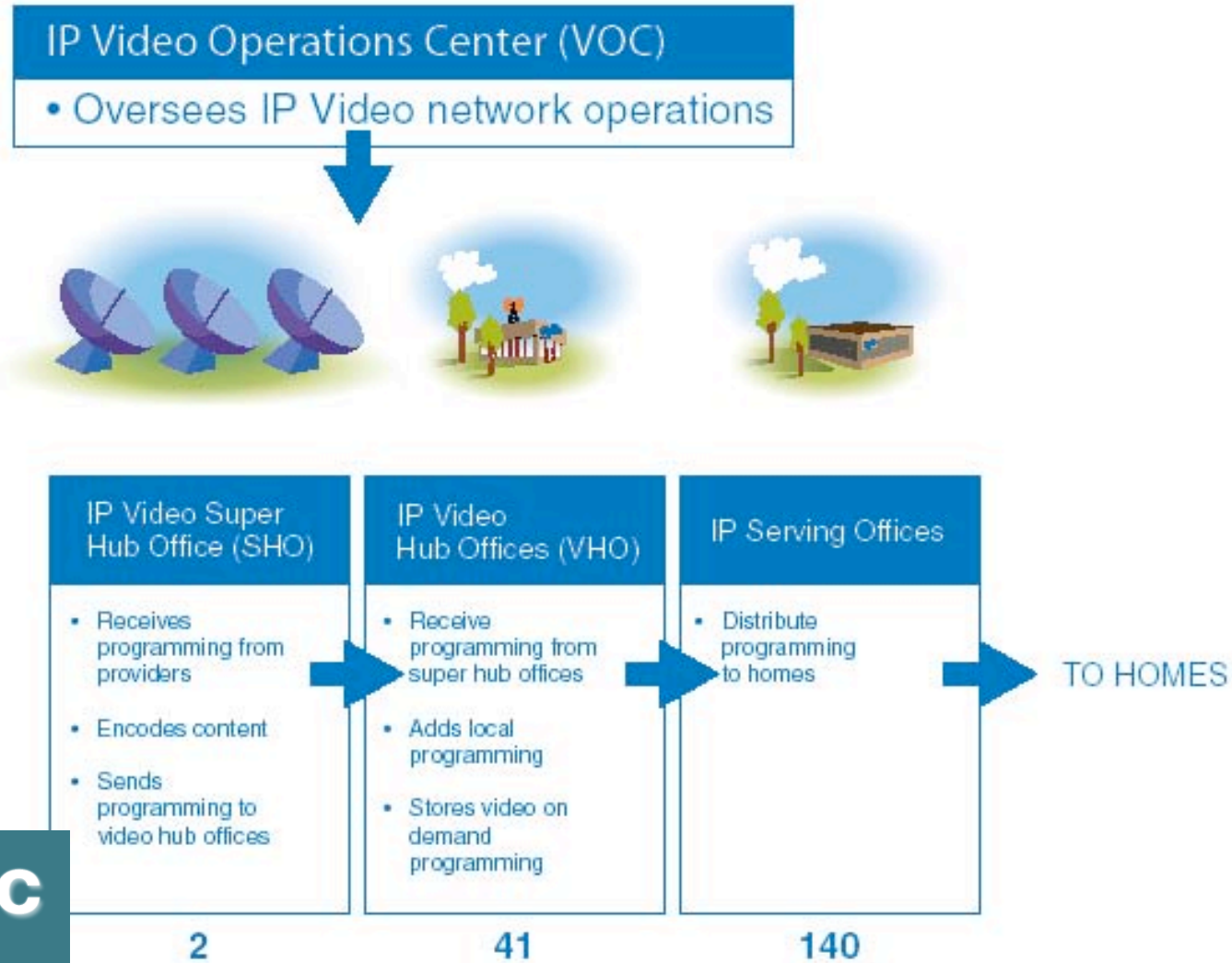
Technology

What Does Scientific Atlanta Bring to Cisco?





Video Network Architecture



IPTV Set Top Box





Middleware Experience and Flexibility



Set top boxes and head ends are **the touch points** for middleware

Decades of Experience

- Developing in-house middleware
- Partnering with major middleware providers
- Large scale deployment

Scientific
Atlanta
A CISCO COMPANY

K|I|S|S

Flexibility

- Closely work with Microsoft
 - At ATT/SBC and other telcos
 - Joint development—Drivers, specs integration and testing
 - Onsite engineers at MSFT facilities
 - Range of IP set-tops using both ST and Sigma silicon
- Work with many middleware providers
 - Myrio, NDS and others

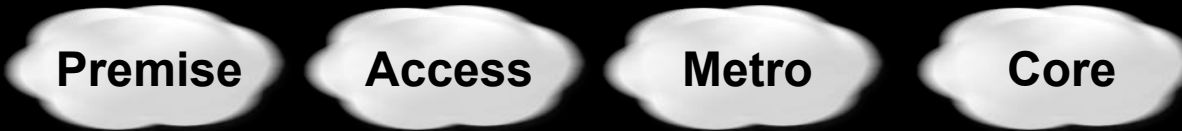


Cisco IP NGN Architecture Transforming "End-to-End"



Glass-to-Glass

Delivery Systems



Premise

Access

Metro

Core



Order-to-Bill

Operational Systems

Economics of IPTV: ++ ARPU ... - CHURN

“Triple play contributed to a reduction in **customer churn** form 17.1% to 12.9%”. (ntl)

“The **increase in monthly ARPU** €61.8 in Q2 2003 and the **decrease in churn** to 16.1% is due to the increase in its triple-play penetration form 7% a year ago to 13.2% now.”
 (Telewest)

“**Customer churn** has been reduced to 20% of previous level”(PCCW)

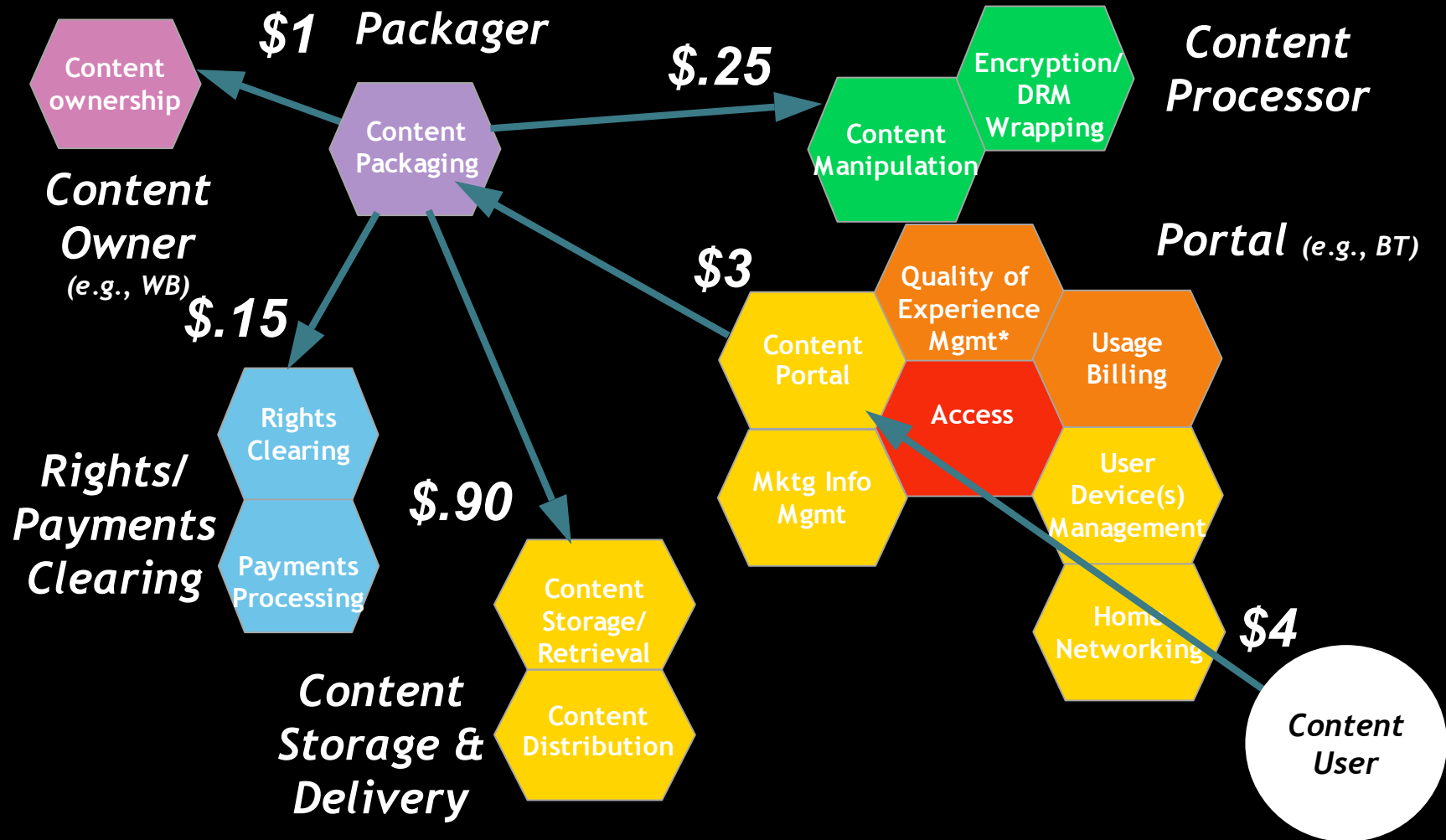


Internet	Telephone	Television
Award winning Internet Simply...	Great value phone calls	Great value Digital TV
<ul style="list-style-type: none"> - Faster! - Better! - Cheaper! 	<ul style="list-style-type: none"> - Peace of mind - More choice - Keep your existing number 	<ul style="list-style-type: none"> - Over 40 Digital TV channels - Plus 40 digital radio channels - Free TV email*
from £8.99 per month	from £9.50 per month	from £18 per month (including your line rental)





revenue sharing typical model



Source: Ovum 2005

Check of IPTV “business case”

- **Gross service margin = ARPU x 50% x (1-30%) = 35%**
LLU + DSLAM = 0 incremental (!)
IPTV e-2-e SW = \$45 / sub
IPTV non-network HW = \$160 /sub
IPTV network contribution / distribution = \$20-50 /sub

- **Depreciation = 4 Years**
- **$(45+160+25) / (4*12) = \$4.79 / \text{month}$**

→ Min ARPU = $\$4.79/35\% = \14 ... This is just to keep the lights on

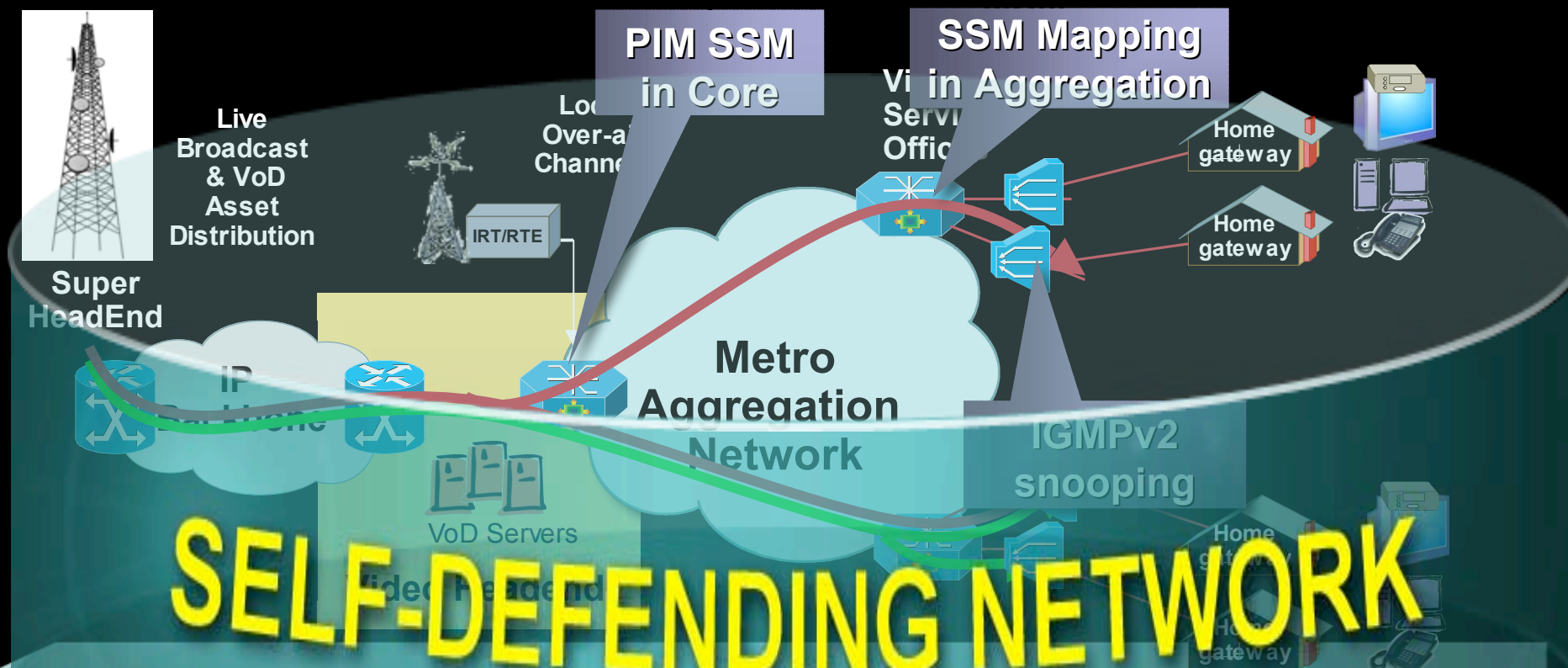
$\$14 \times 12 \text{ months} = \$165 \times 10\text{M subs} = \1.65B ... Is the market big enough ?

Control of network TCO is vital



High-Performance IP Multicast for IPTV

Efficient Bandwidth Utilization for Scalable Broadcast TV



BENEFITS

Optimizes Network Utilization

Aggregation, Access GigE Link

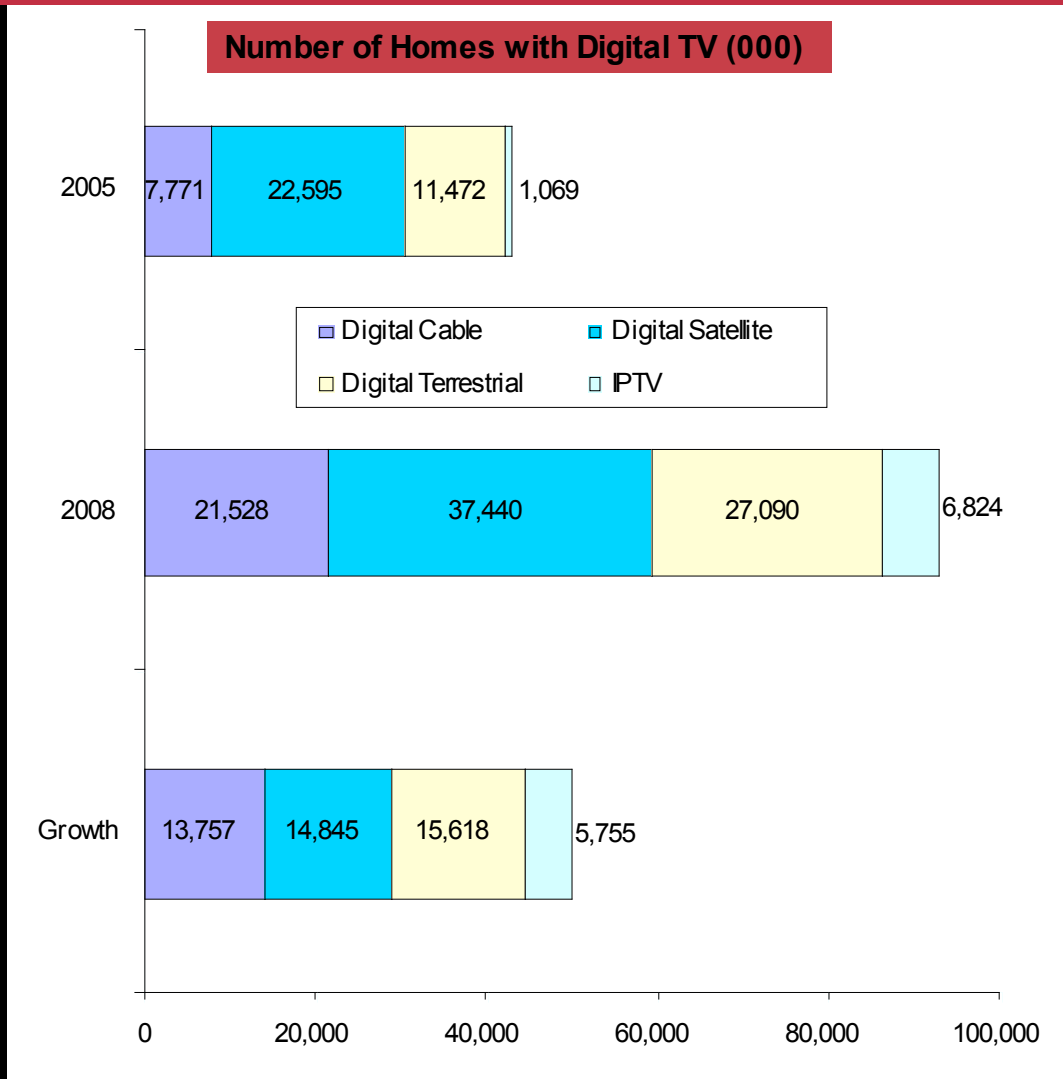
Single tree of SSM matches video Distribution; no RP

Higher Security

Source Specific Multicast provides protection against DOS attacks

TV landscape in W. Europe

Transition driven by digital TV migration



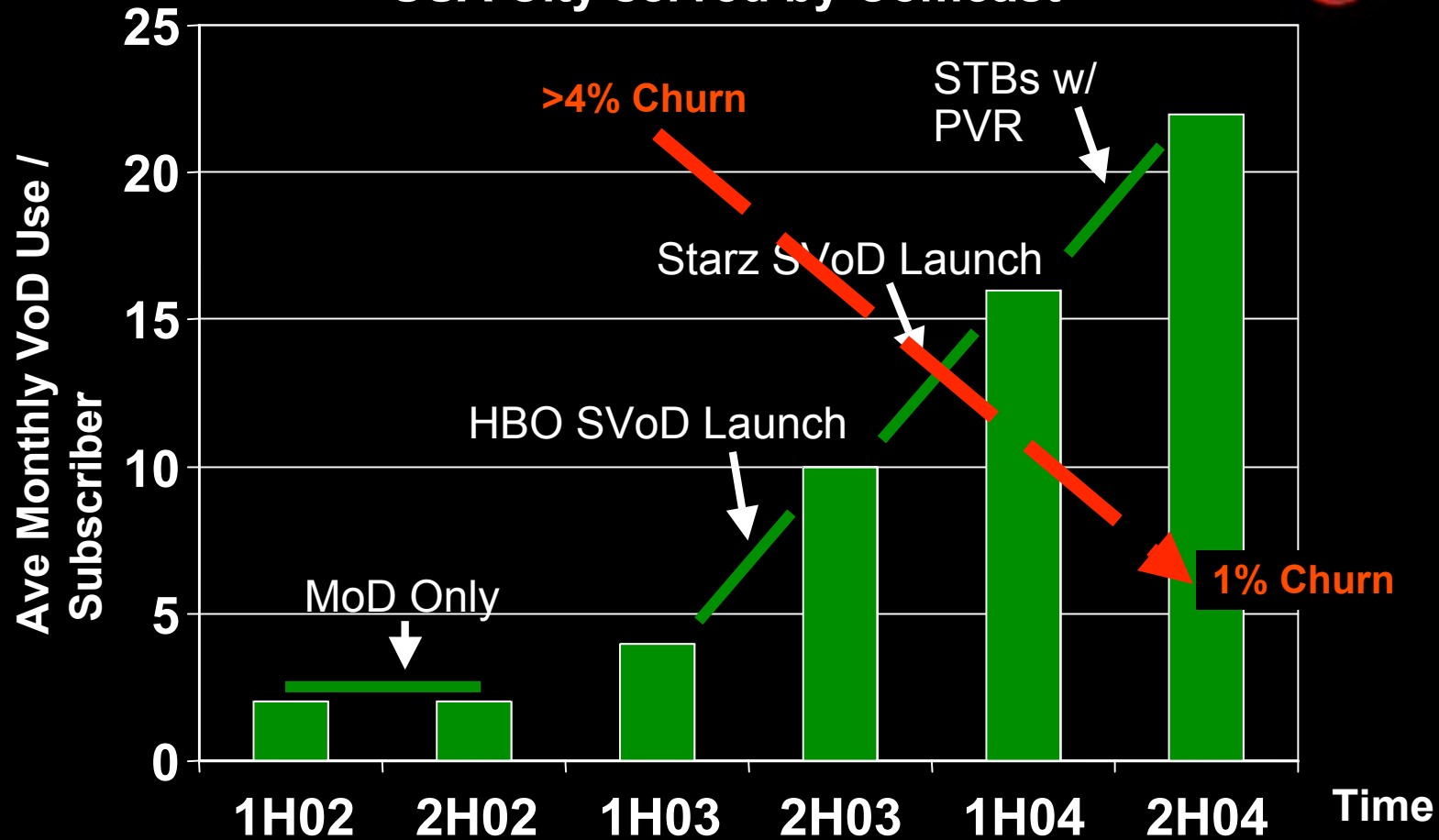
Source: EU, Daxxis, 2005; Reuters Business Insight, 2005

- **EU mandated digital migration**
Complete by 2012
- **161M TV Homes in Europe (EU15)**
2005: 27% have Digital TV
2008: 57% have Digital TV
- **Most of these require a STB**
iDTV accounts for some connections
- **Leaves 68M analogue Homes in 2008**
118M in 2005



Video On Demand - Usages & Values US Cable Example

Ave Monthly VoD Use / Subscriber in one USA City served by Comcast



MoD: Movie On Demand

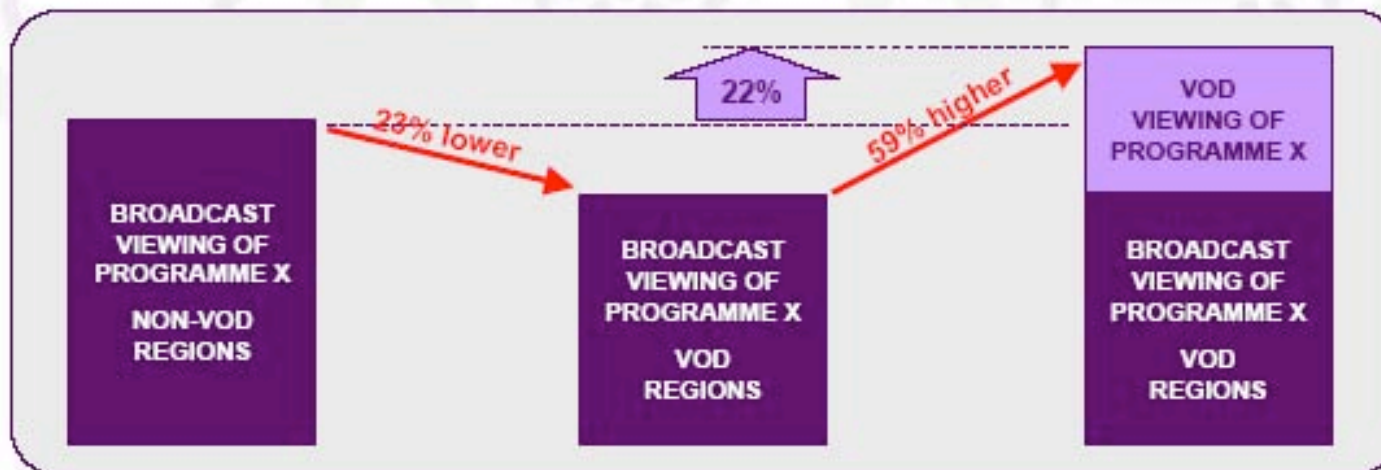
SVoD: Subscribe Video on Demand

PVR: Personal Video Recorder

Nov 04: In last 90 days 68% of all digital subs ordered on-demand *

Ntl: “Pick of the Week”: Positive impact of VoD on viewing figures

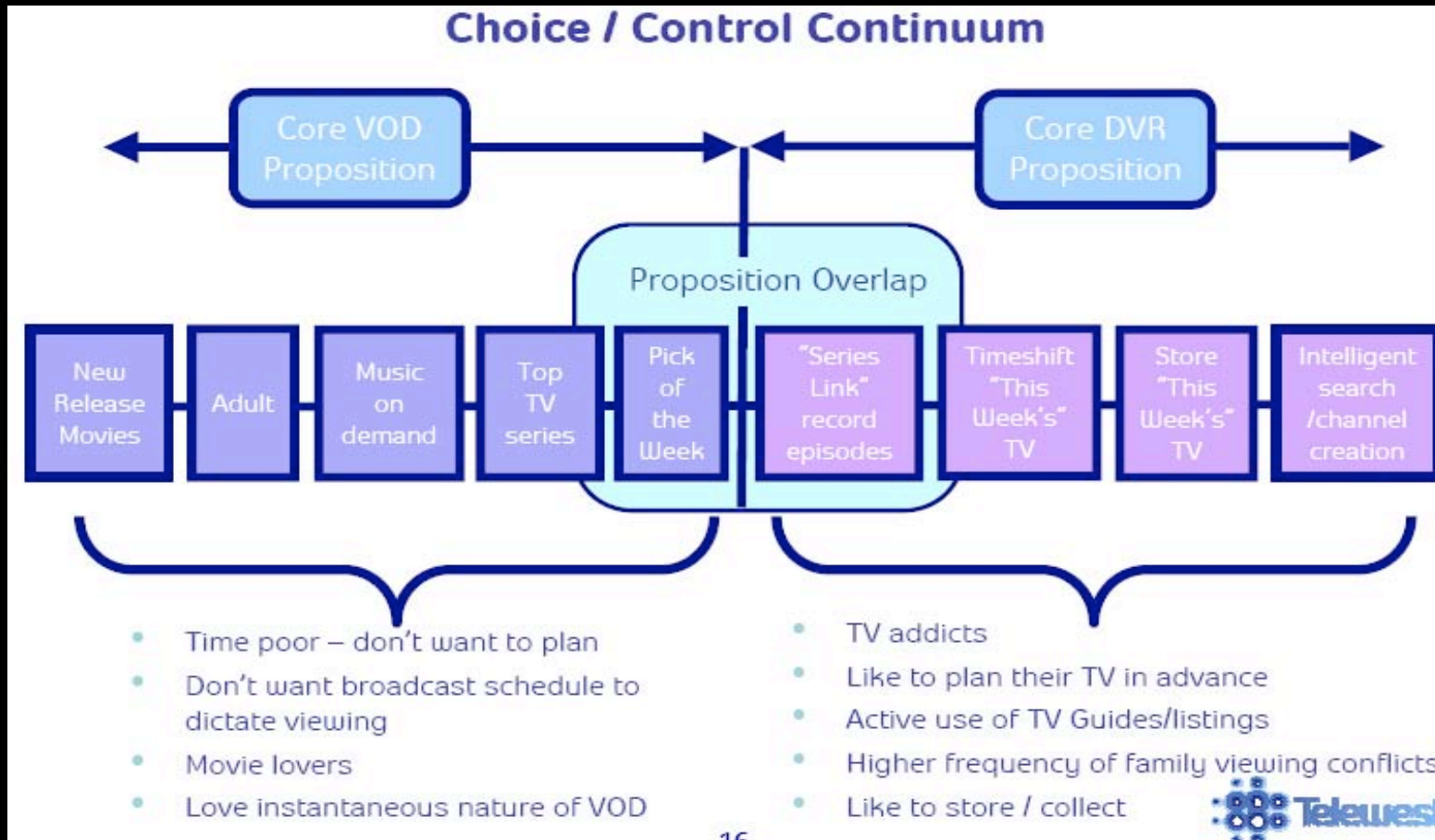
- A free service that allows our customers to catch BBC shows they may have missed
- Customers believe this gives them flexibility, and that they are watching at different times rather than watching more overall¹
- We are starting to see some evidence that programmes are generating incremental views - combined viewership of a high profile show available on POTW was estimated to have received a 22% growth in viewers from VOD²



Sources:

- (1) Prescient VOD Research, Feb/Mar 2005
- (2) Based on loss of broadcast audience in controlled VOD region, and additional viewing through VOD

October 2005



- Enabled by STB with embedded hard-disk, and DVR capabilities
- Sold as a flat free subscription services (e.g. \$10 in Time Warner)



Beyond Just IPTV to IP Rich Media

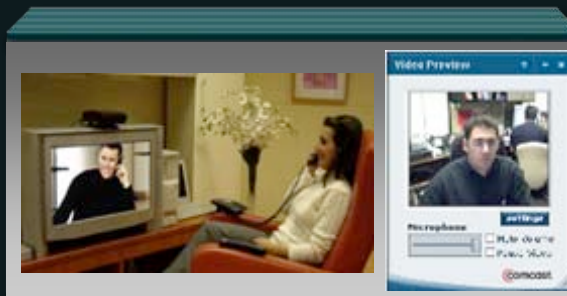
CONSISTENT BRANDED EXPERIENCE Video Service Types

Managed Video Applications



BROADCAST TELEVISION

Video Communications Services



VIDEO PHONE / VIDEO CONFERENCING

“Over the Top” Video



VIDEO STREAMING



VIDEO ON DEMAND TV ON DEMAND / nPVR



GAMING / INTERACTIVE TV



VIDEO TO OTHER DEVICES



“Dis-intermediation” is a tangible risk



... FAT PIPE ?



TELIO



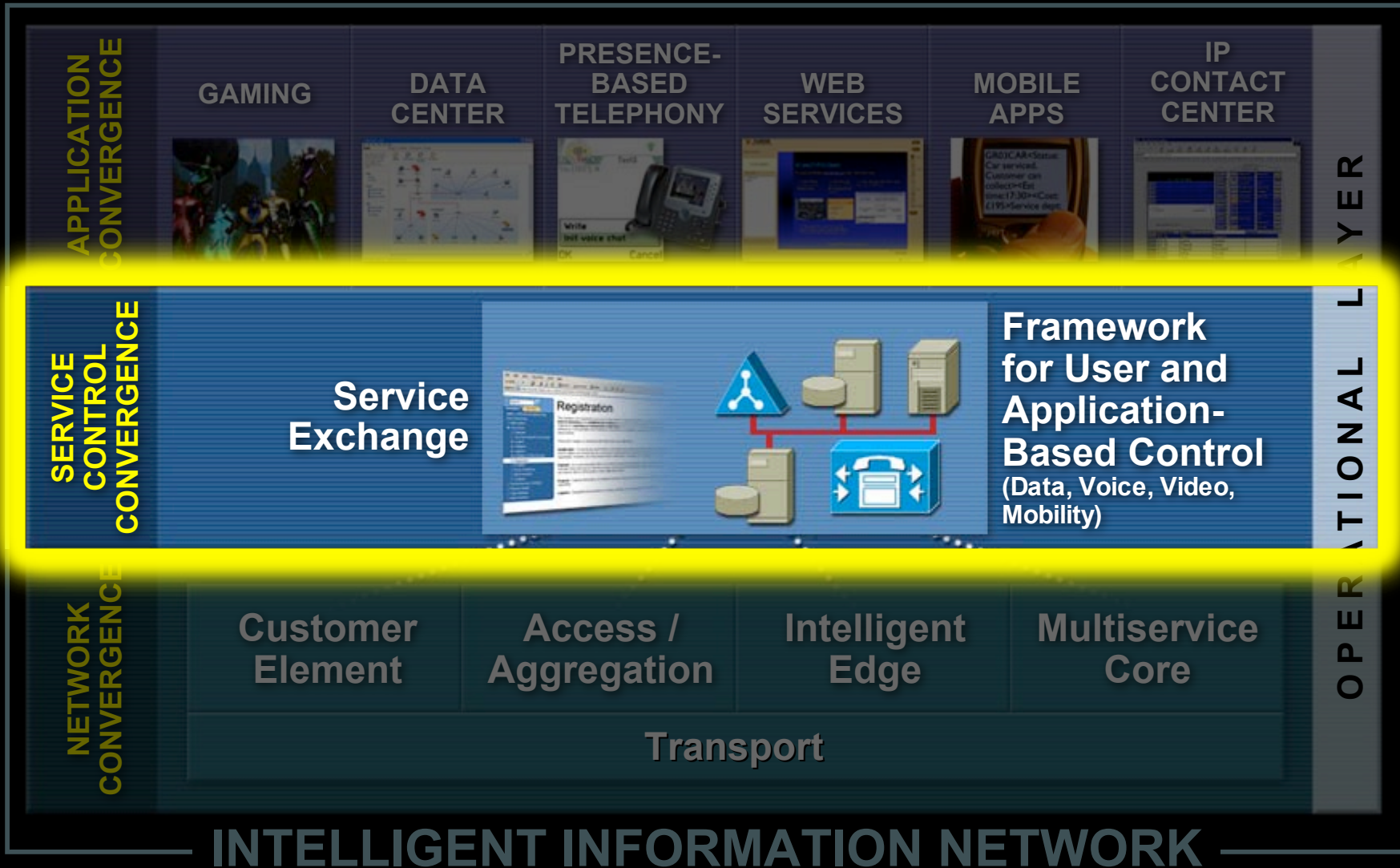
Movies Channel
Film Clips & Trailers, Exclusives, Interviews, Showtimes.



IP NGN is meant to drive towards ...



Service Exchange Framework in the IP NGN



The network will provide more services to support new business models

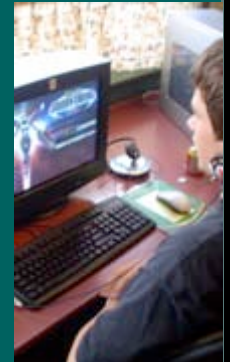
WHO?

- Who is the user?
 - Devices
 - Profile
 - Location
 - Presence



HOW?

- How can I dynamically control resources?
 - Rich media control
 - Monitor & charge on a per service/per user basis
 - Enable application awareness



Service Exchange Framework

WHAT?

- What can the user do?
 - Within what timeframe
 - To what extent
 - Under what rules



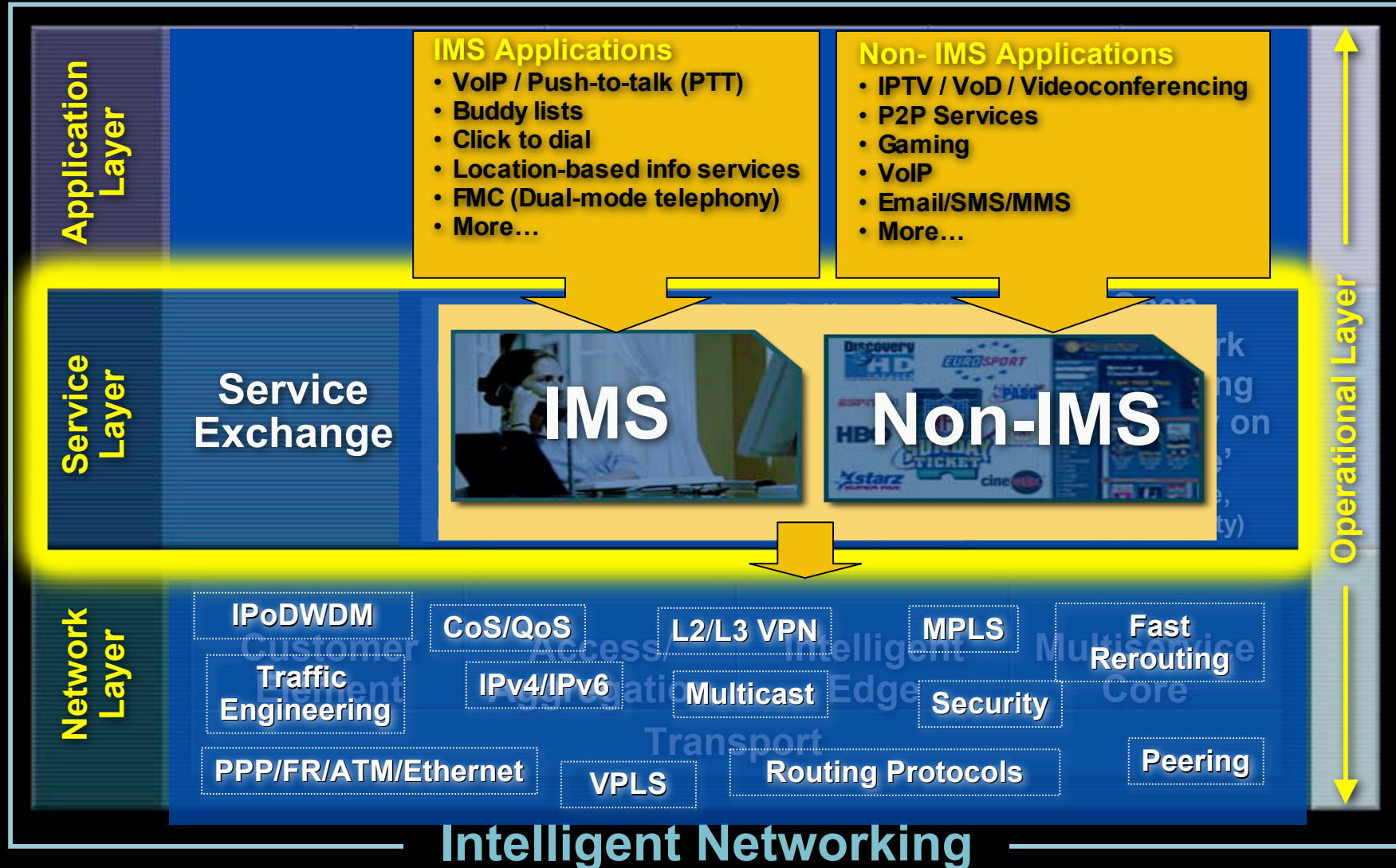
WHERE?

- Where can the user roam?
 - Track/recognize user devices across carriers
 - Maintain user sessions across multiple networks
 - Offer all services in all locations



Service Exchange Framework

Comprehensive Support for Both IMS and Non-IMS



Cisco Video/IPTV Protecting QoE – The Need for Video Admission Control

- **What happens when demand exceeds design assumptions?**

Network design based on some allowed blocking factor

Blocking factor based on peak concurrency rate of subscribers at the finite take rate of the service

What if take rate of service is higher than forecast?

What if HDTV, TVoD is accelerating faster than forecast?

What if peak concurrency is higher than forecast?

- **Without a “Graceful Busy Signal” for video service, excess streams result in degraded video for Many**

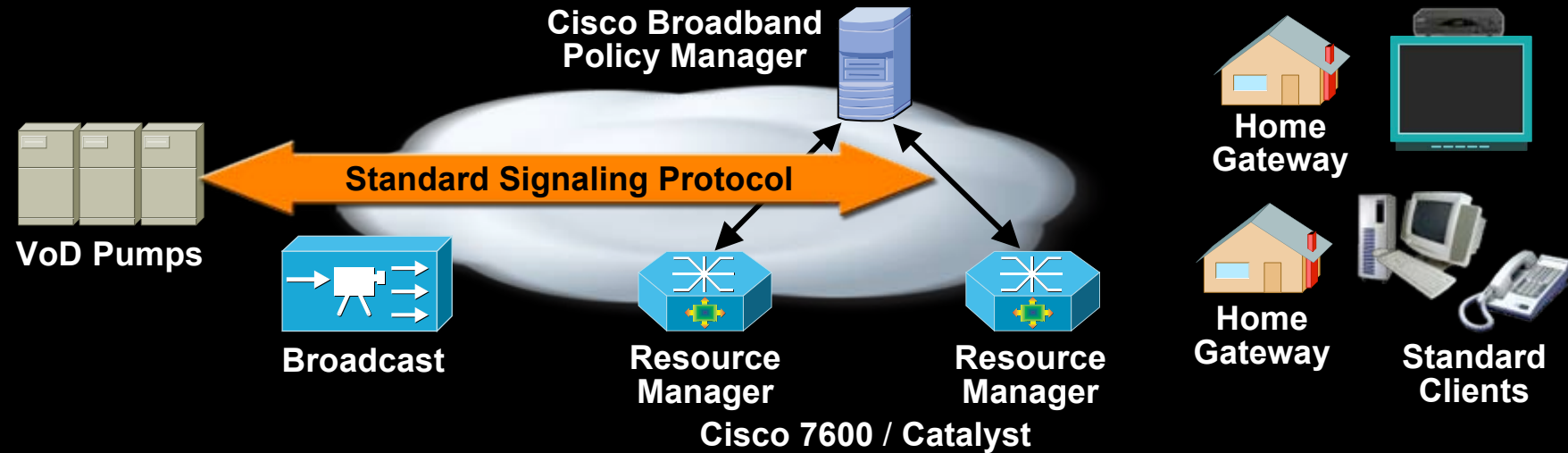
Oversubscription leads to random packet loss for many!

Remember! No more than one artifact per 2 hours => 10^{-6} PLR

Loss mean visible artifact on subs' TV for a varying amount of time



Cisco Video/IPTV Protecting QoE – Efficiently Managing Oversubscription



- **Preserves Quality of Experience**
 Network-based graceful busy signal when demand exceeds capacity
- **Covers complex (e.g., redundant) network topologies**
 Uses Standard Protocols
- **Integrates Business Policies into Admission Control Decision**



Measuring Video/IPTV Quality of Experience – Proactive Measurement Required

- **Collecting Statistics for Video/IPTV Packet Loss Rate (PLR)**

Periodically collect MIB counters/data for each channel/stream

Difficult, time-consuming to detect low levels of packet loss with any statistical significance; Not proactive!

- **Track RTP Sequence Numbers per IPTV Channel / Stream**

Accurate Loss Statistics as it can detect Low Levels of loss on each IPTV stream near instantaneously

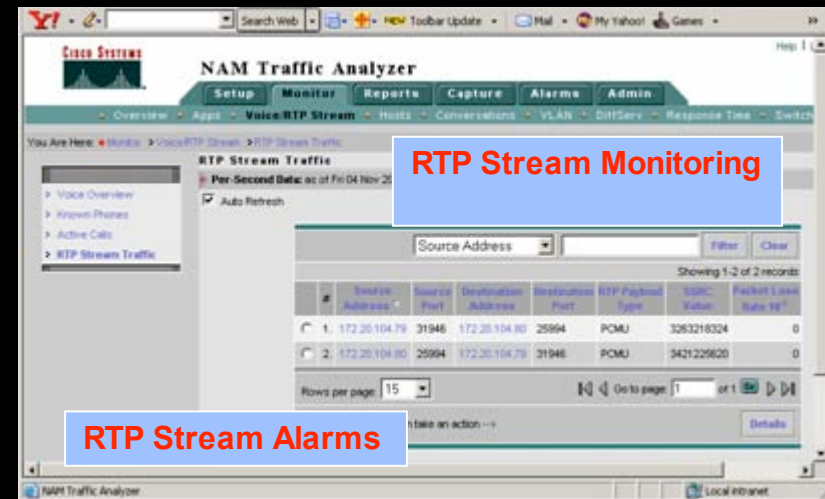
Can also be used to measure jitter

Compliments STB quality data (RTCP reports, MPEG PQR, etc)

- **Loss Recovery/Conceal Options**

RTP Retransmissions

FEC



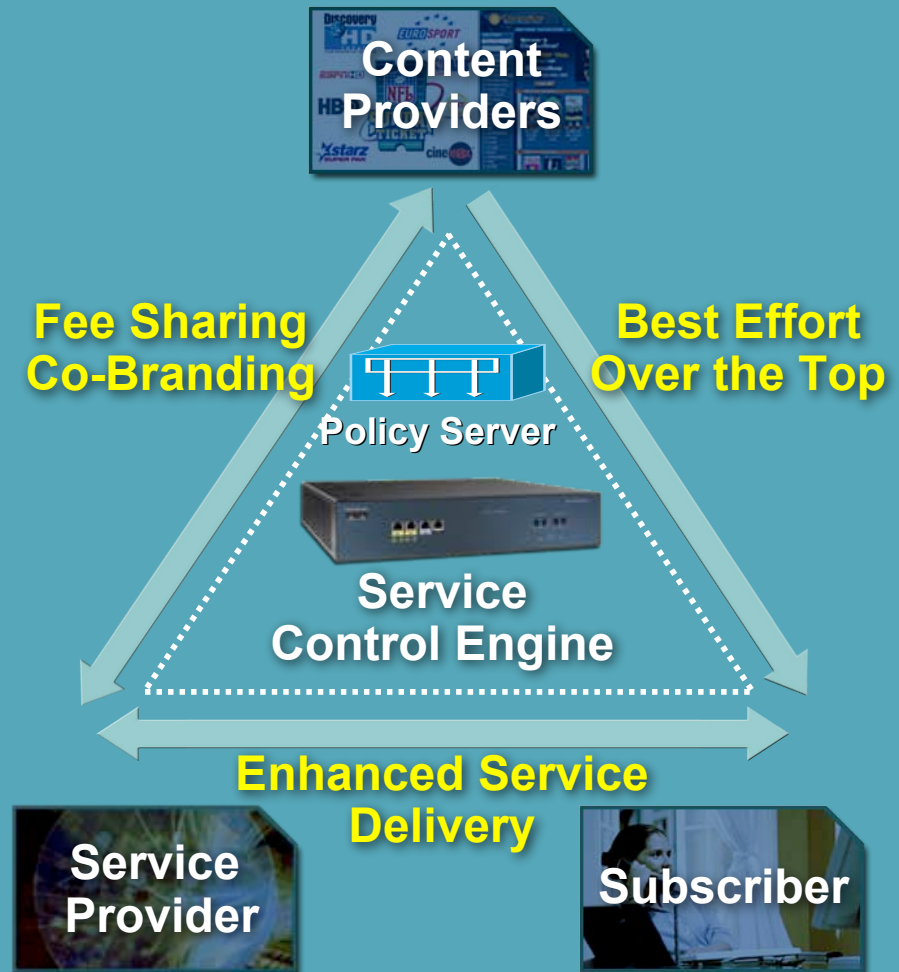
- **More analysis on demand**

Network can non-intrusively copy streams situational/on-demand

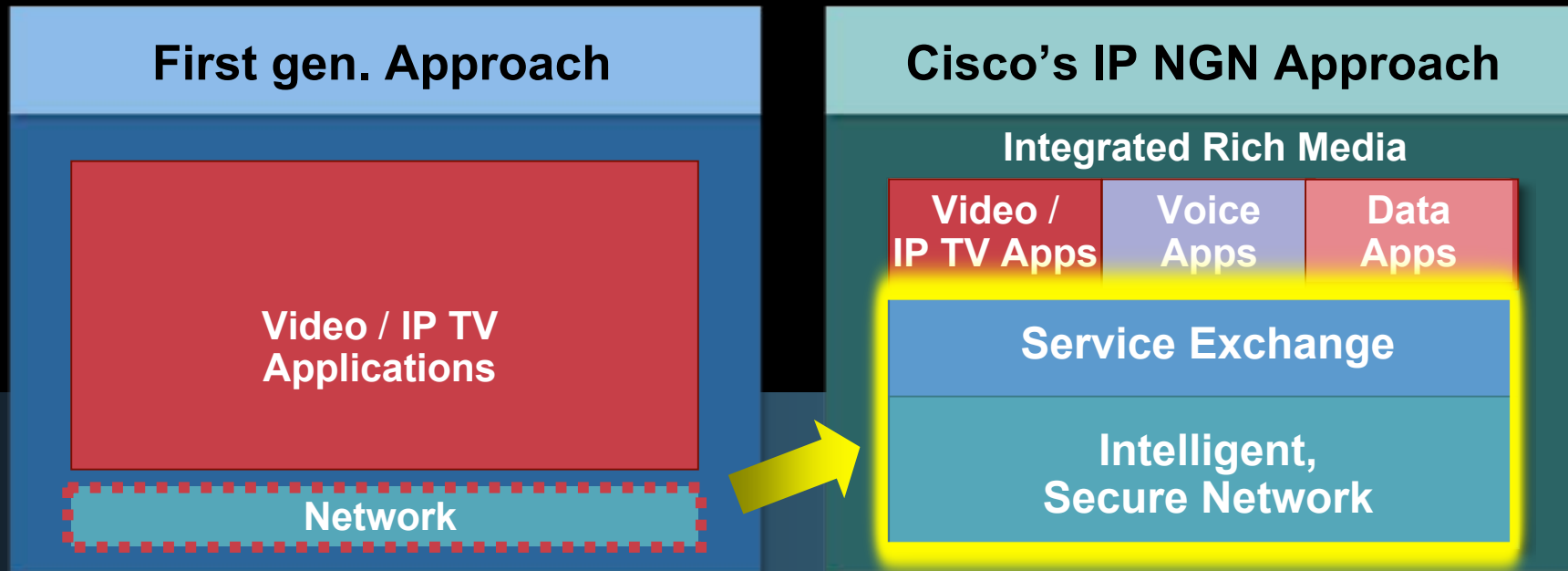
Send stream copy to appliances - local or back in a VOC - for more detailed analysis (MDI, MOS, etc)

Inserting Value-Add on “Over the Top” Video Service Delivery: From Best Effort to QoS Enabled

- **Unaffiliated third-party services**
 - Detect and manage third-party video traffic and aligning QoS
 - Facilitate Service Exchange partnerships for providers
- **Affiliated TV streaming over high-speed broadband**
 - Subscriber-enabled CoS
 - Detect/alert traffic anomalies
 - Identify and detect video originating from any content delivery network

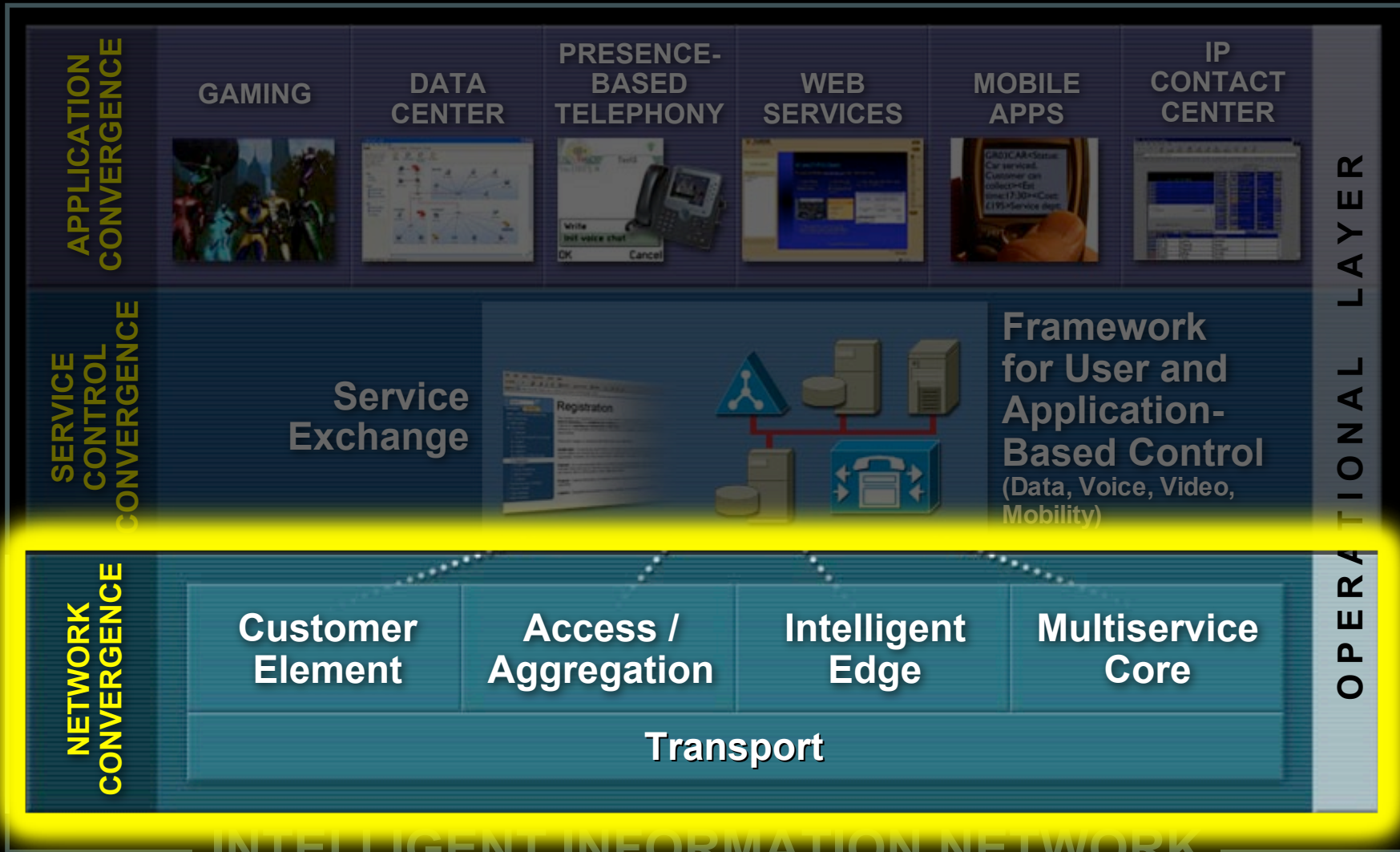


Building “content awareness” in the network





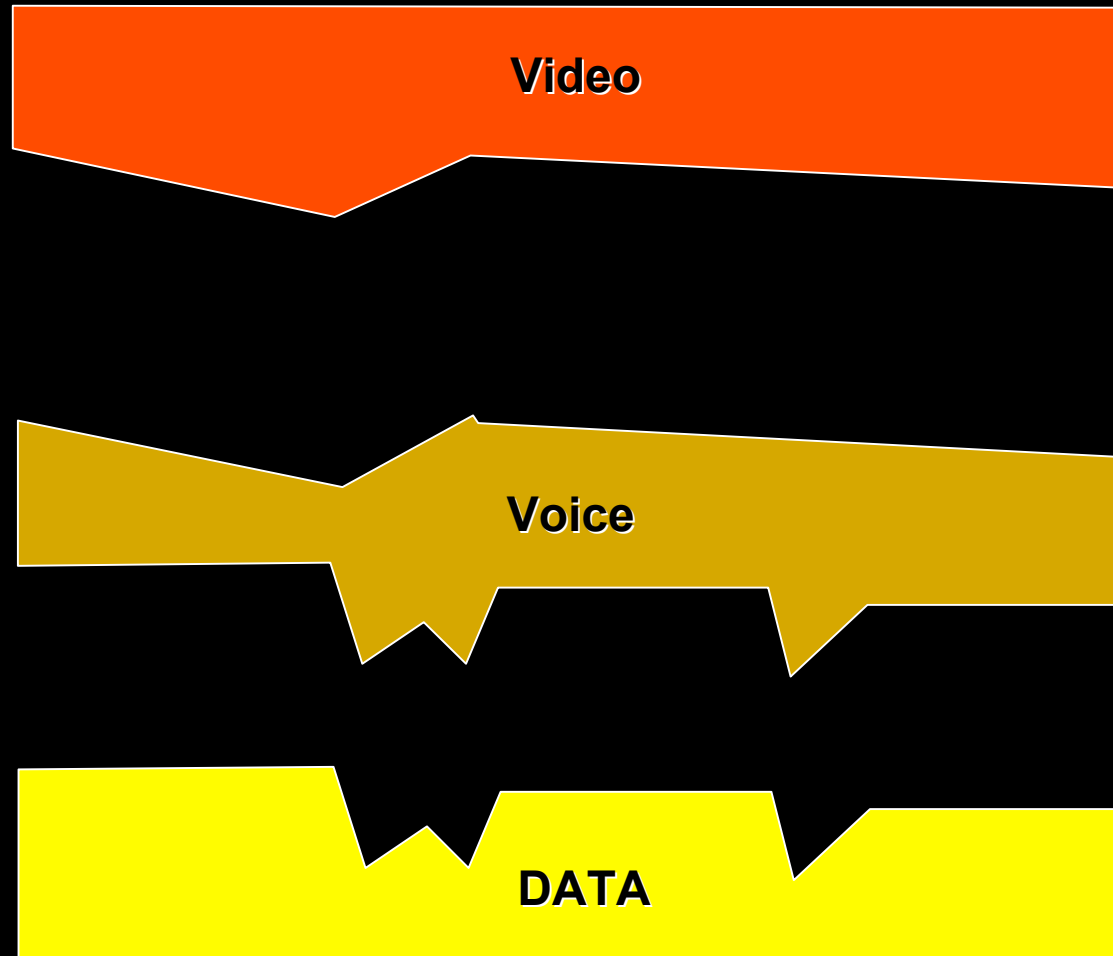
The Foundation: Network Convergence



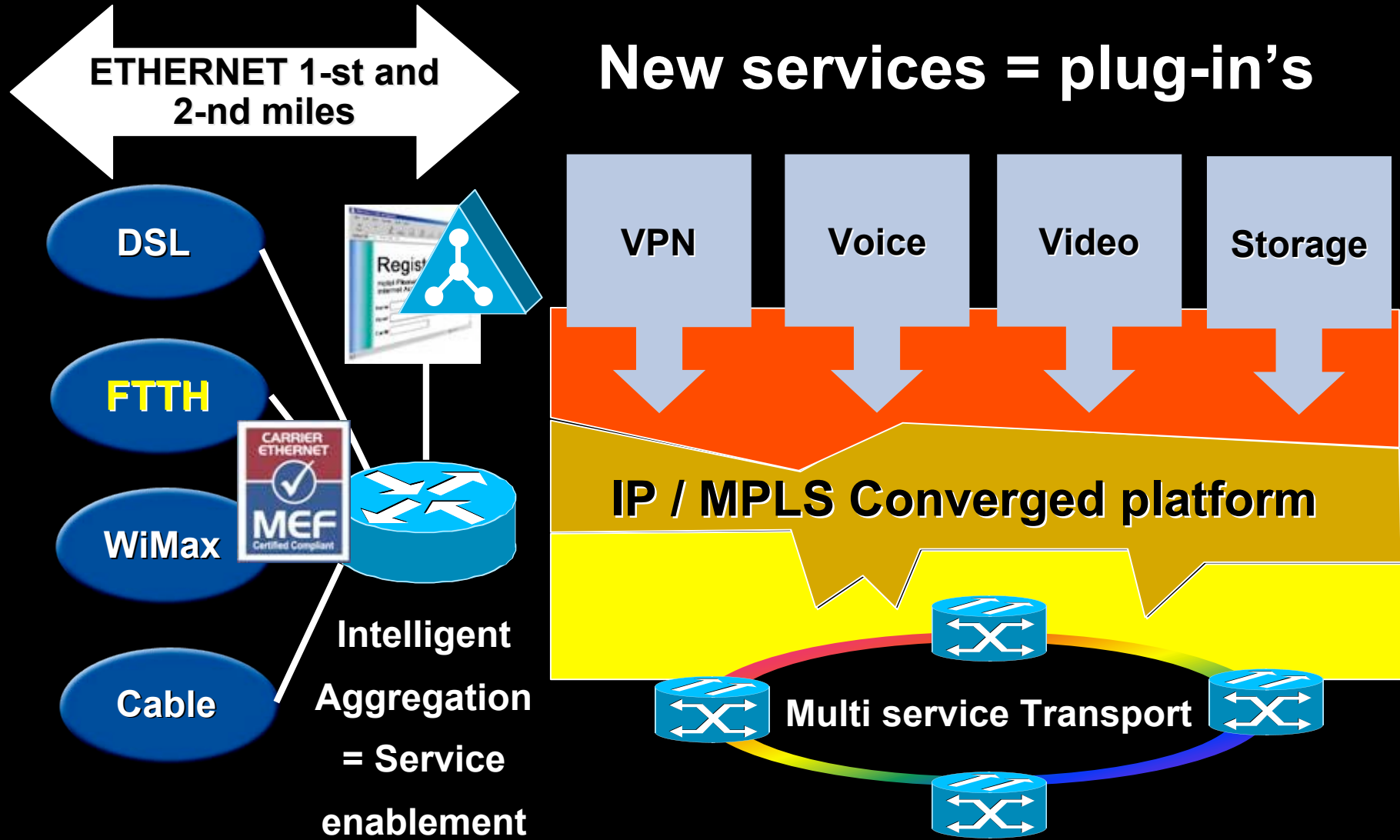
INTELLIGENT INFORMATION NETWORK



Cisco SP network vision



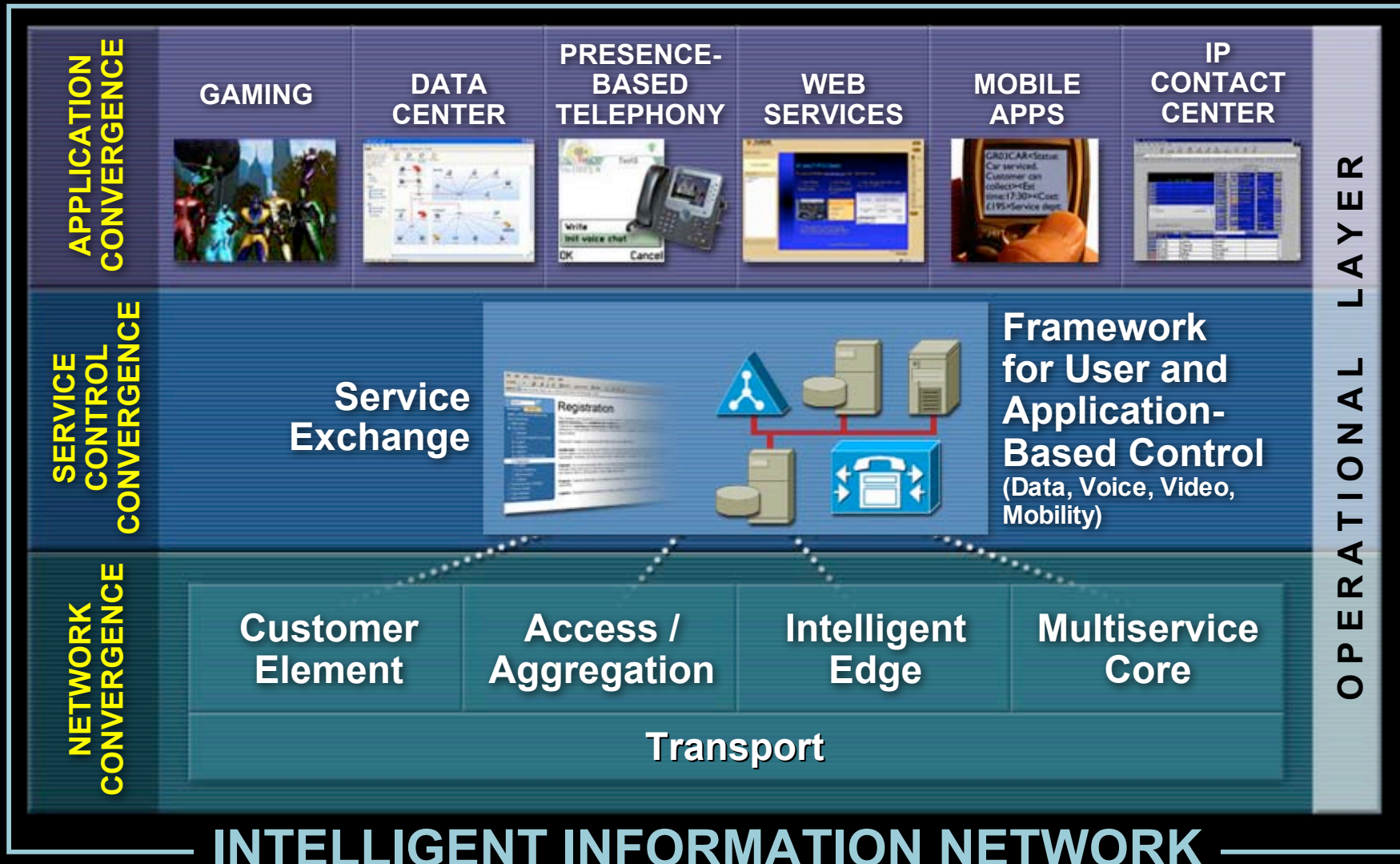
Cisco SP network vision





Cisco IP NGN Architecture

Achieving a Whole Greater Than the Sum of the Parts





Cisco Service Provider Vision

CONNECTING CUSTOMERS WITH SERVICES,
SERVICES WITH NETWORKS,
AND NETWORKS WITH EACH OTHER

CONSUMER



SMALL/MEDIUM
BUSINESS



ENTERPRISE



SP
WHOLESALE



IP NEXT-GENERATION NETWORK

VPNs



INTERNET



CONTENT



VOICE &
VIDEO



MOBILITY



TRANSPORT

CISCO SYSTEMS

