



Cisco Mobile Packet Core

Peter Gaspar

Consulting System Engineer

Emerging Theater



Mobile Internet Evolution

Shifting Environment

New Business Architecture

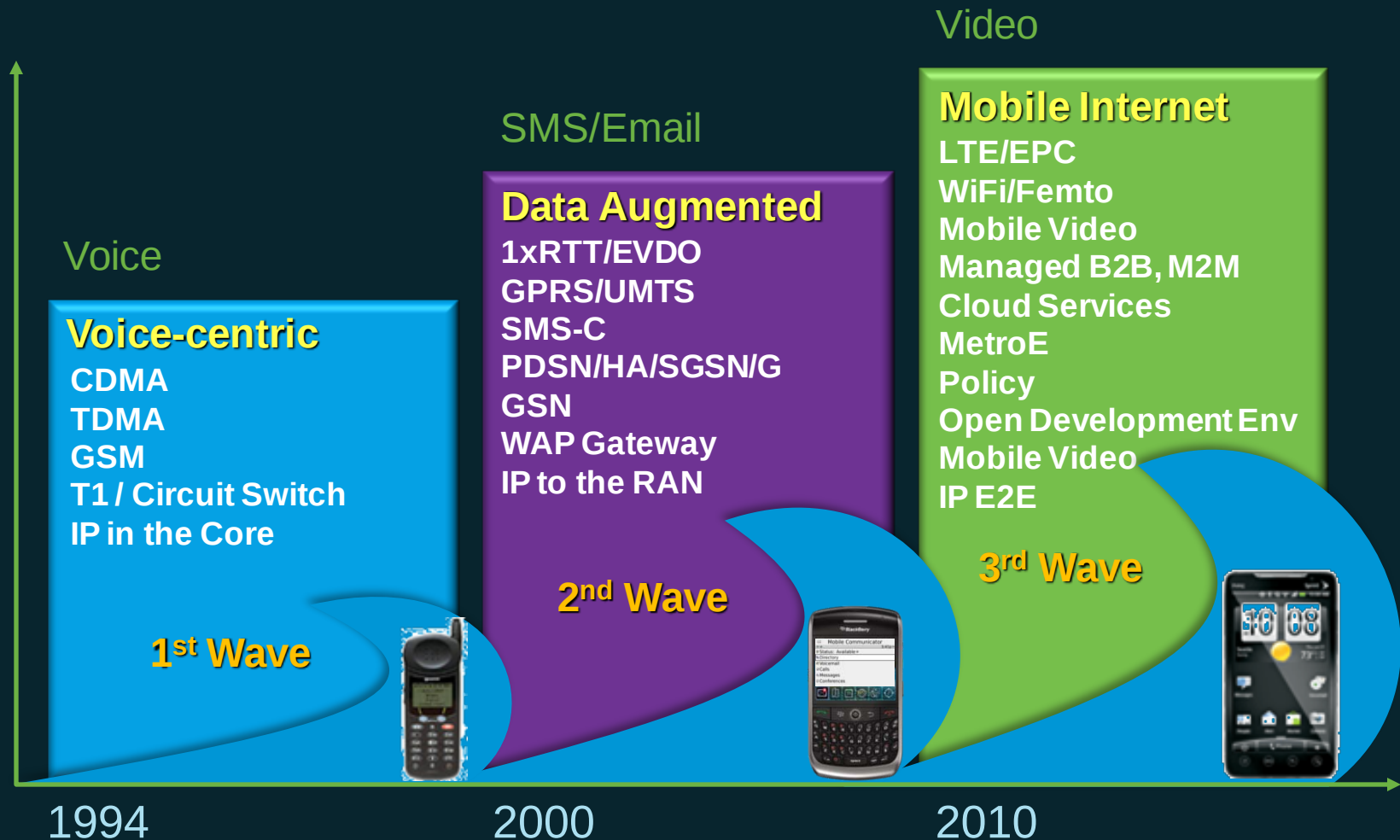
Intelligence Driving Profitability

Service Differentiation through Next Gen Mobile Network Architecture

Cisco - IP and Mobility Expert

Evolution of the Mobile Business

Empowering the User



Mobile Communications: Shifting Environment

Business

Operator Competitors
Voice Revenues
Walled Garden
B2C Model

OTT Competitors
Multimedia Revenues
Hosted, OTT, App Store
B2B2C Model



Entertainment

Information



IP

Traditional Expertise

End User
Experience

Mobility / IP Expertise

2G, 3G ...
Circuit

Network Services
Access Focus

3G, 4G, WiFi, Femto
IP

Cloud Services
Services Focus

Technical

Users Are Demanding More . . .



Consumers want more personalized experiences



Consumer Experiences

- More visual
- More social
- More personal

Business users demand greater productivity



Business Experiences

- More collaboration
- Better returns
- Improved mobility/portability

... Driving More and More Traffic

There will be 5B mobile devices and 2B M2M nodes



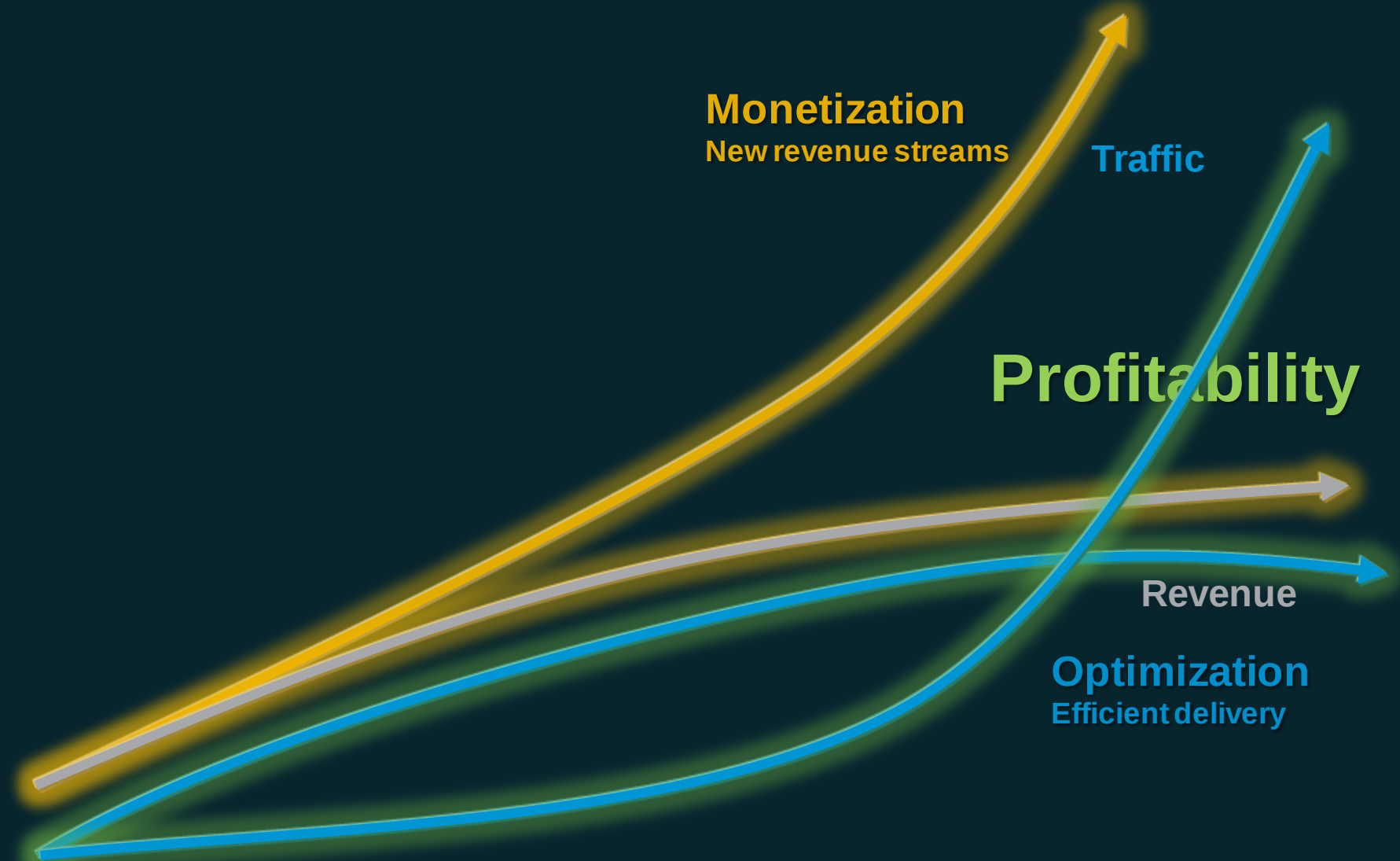
Global mobile traffic will grow 26X to 6.3 EB/mo



Video to be 66% of All Traffic – 2014

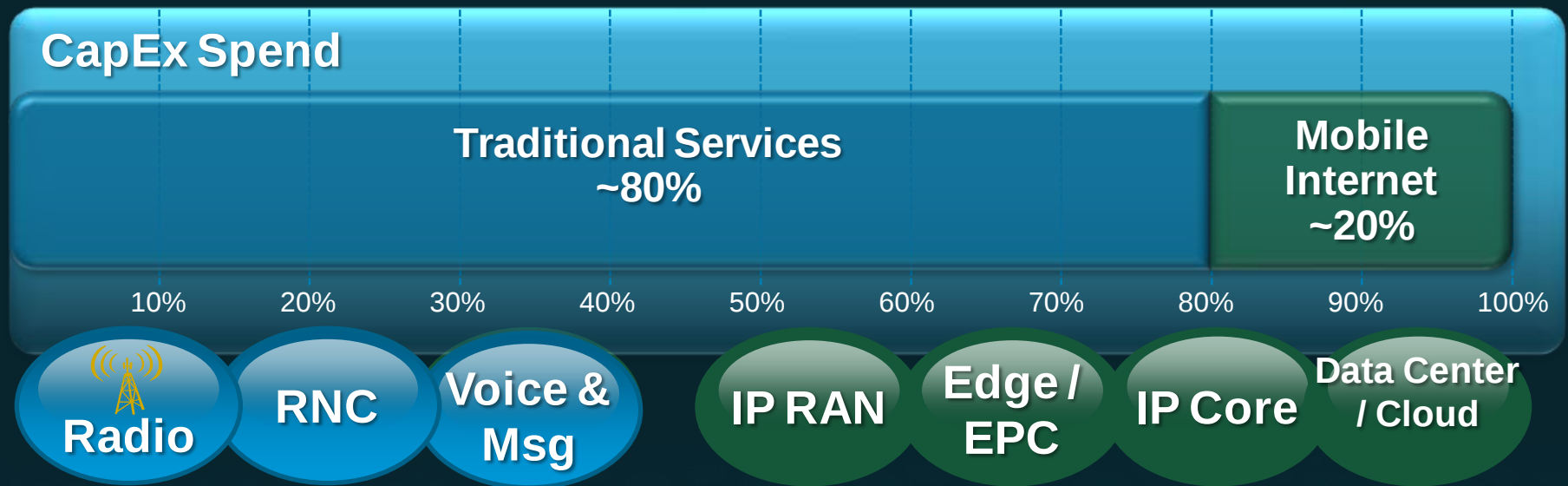
Source: Cisco Visual Networking Index (VNI) Global Mobile Data Forecast, 2010–2015

Challenge of Shifting Environment



What MOVes Your Network:

Investment in Intelligence

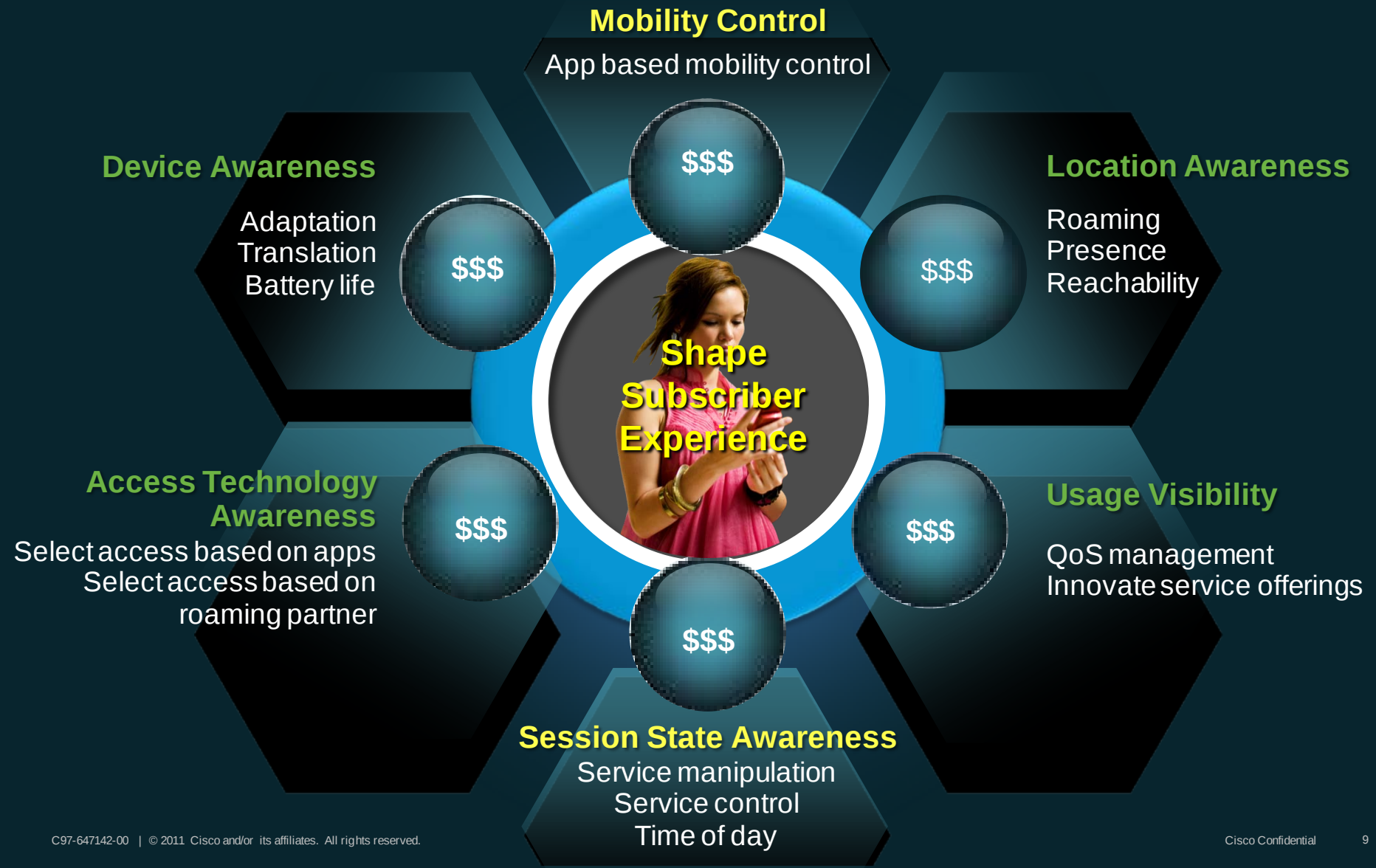


**New \$
Opportunity =**

Mobile Internet is Profitability Engine

Differentiation, new revenues, network optimization, and flexibility

Service Provider Advantage: Intelligence



Mobility Requires Ubiquitous Access



2G, 3G, 4G

WiFi Wireless LAN and Service Mesh

Femto Cell

Ethernet LAN

Cable/DSL



Office

Home

Coffee Shop

Outdoor

On the Go

Radio-independent Partnering to Provide “Any G” coverage

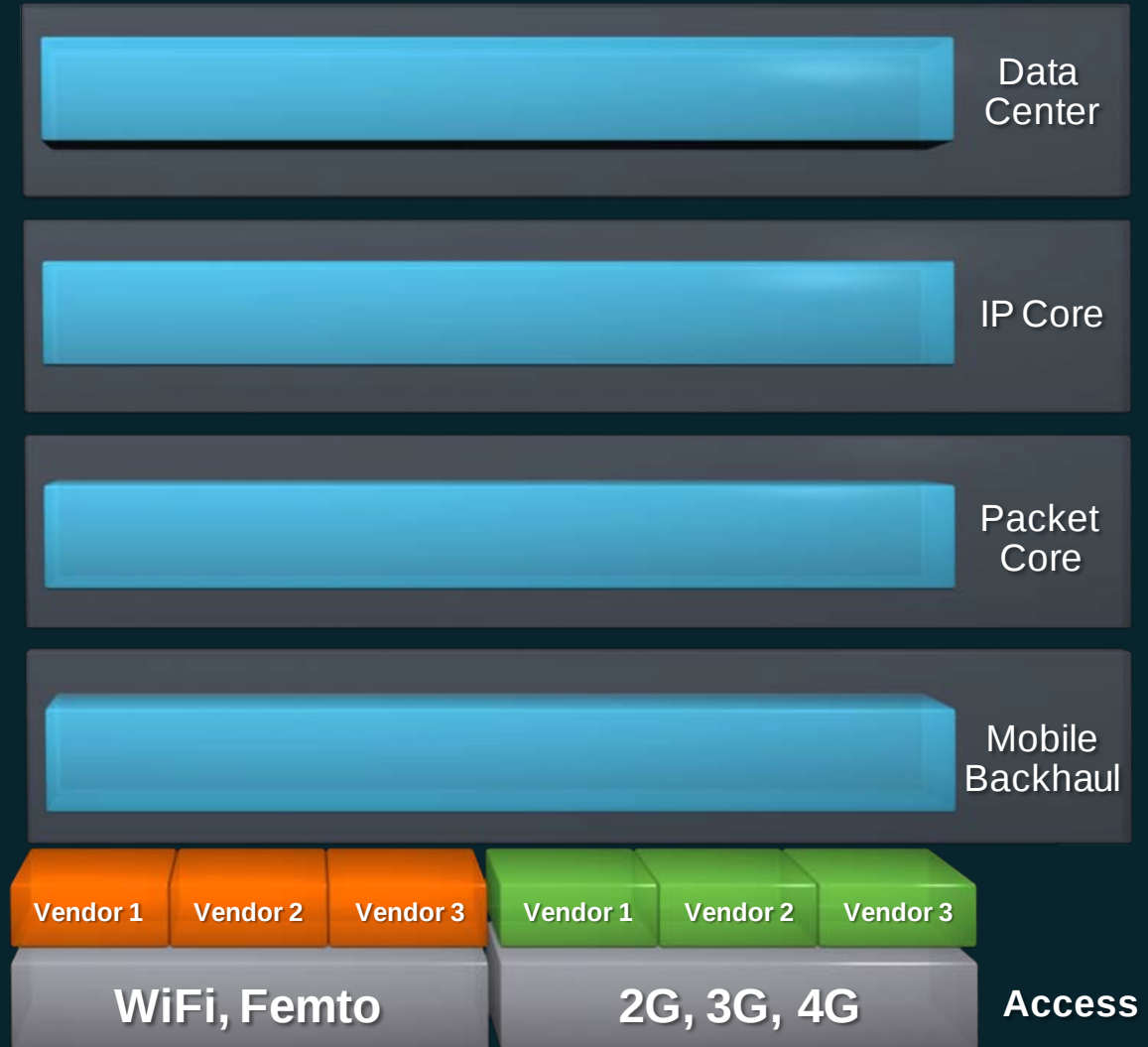
Ubiquitous Access Architecture Models

Common Core for Seamless Experience

VERTICAL MODEL



COMMON CORE MODEL



Cisco M.O.VE

Monetization, Optimization and Videoscape Experience

Mobile Videoscape Experience

Across Devices, Networks and Content



Monetization

- Premium offerings
- Backend partnerships
- Differentiated video services



M.O.VE

Optimization

- Optimal data transport
- Network awareness
- Subscriber intelligence



Comprehensive, Integrated, Intelligent

Cisco's Comprehensive IP Architecture

Adaptive Intelligent Routing – AIR

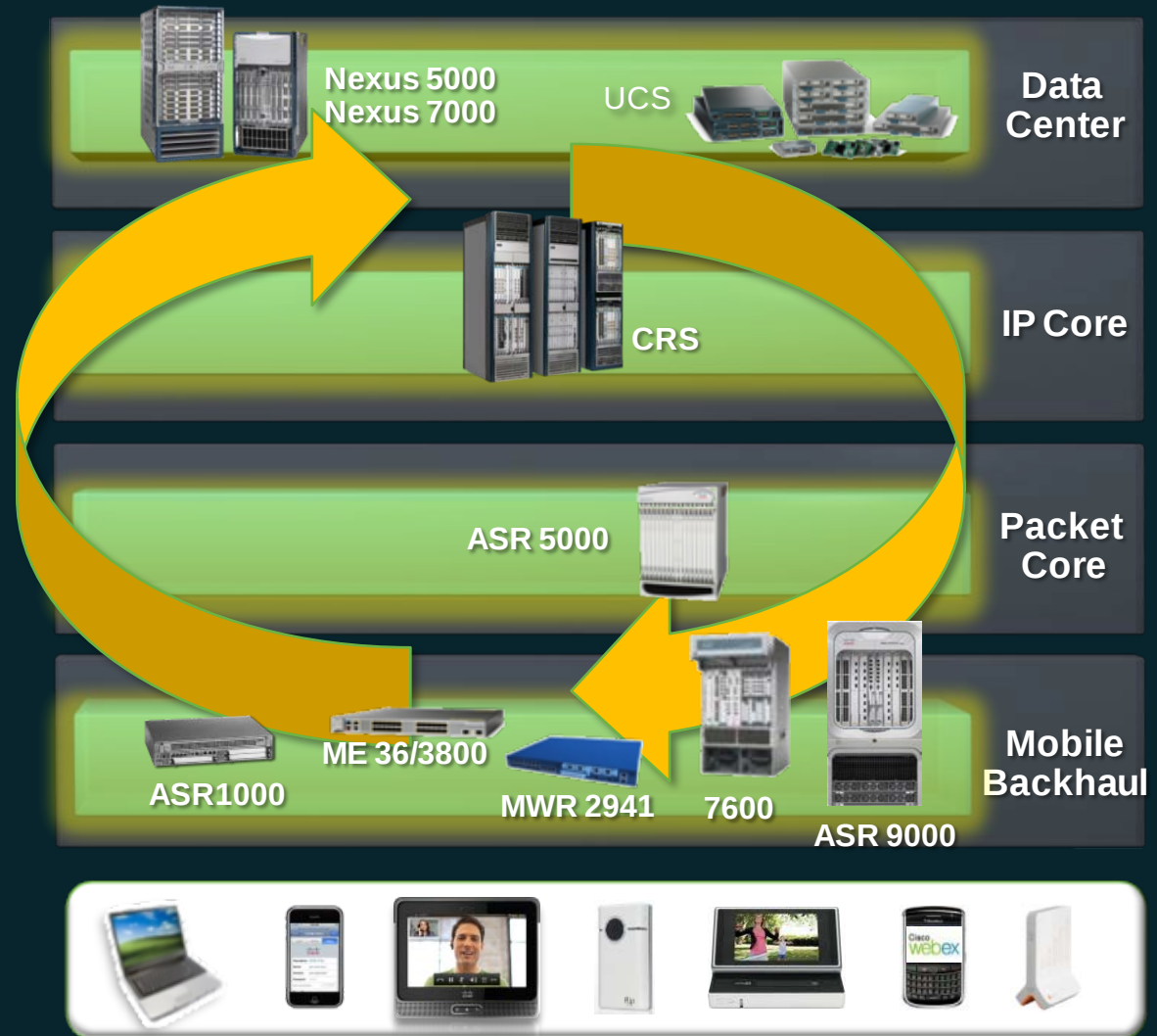
Centralized or
Distributed

Offload at any
Network Point

Traffic and Video
Optimization

Monetization &
New Models

Optimized for
Cloud Services



Cisco Evolved Packet Core



Cisco EPC: Intelligent Performance

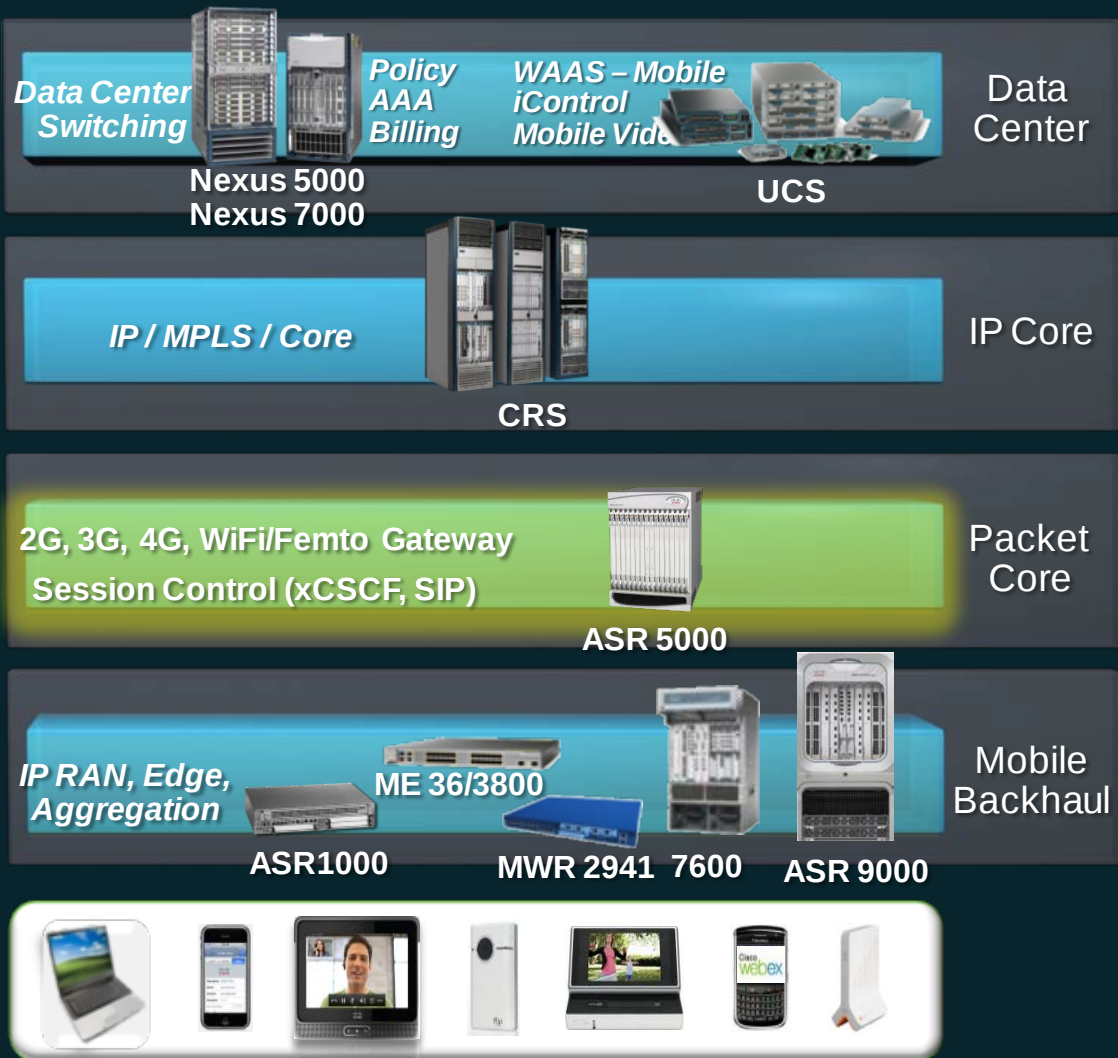
One Network, Any G, Any Screen

Comprehensive

Flexible

Powerful
Performance

Highly
Intelligent



Evolved Packet Core

One Network, Any G, Any Screen

WiFi,
Femto



ASR 5000



**Powerful
Performance**

**Highly
Intelligent**

Reliable

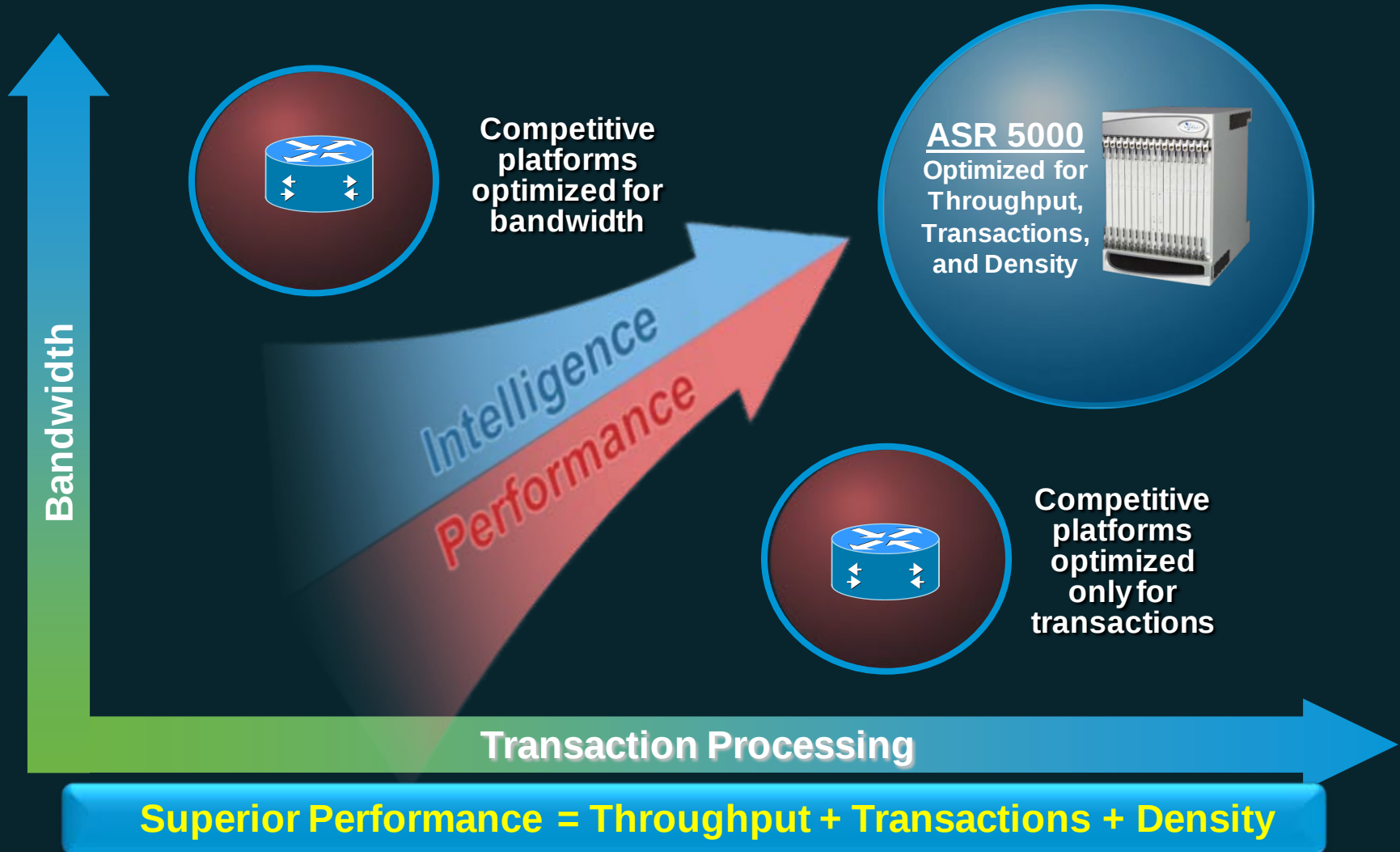
Flexible

**World's #1 UMTS
and CDMA
Operators**

Single Platform for all Control and Bearer Plane Functions

Performance

Industry-Leading Mobile Packet Core Intelligent Performance



Highest Reliability

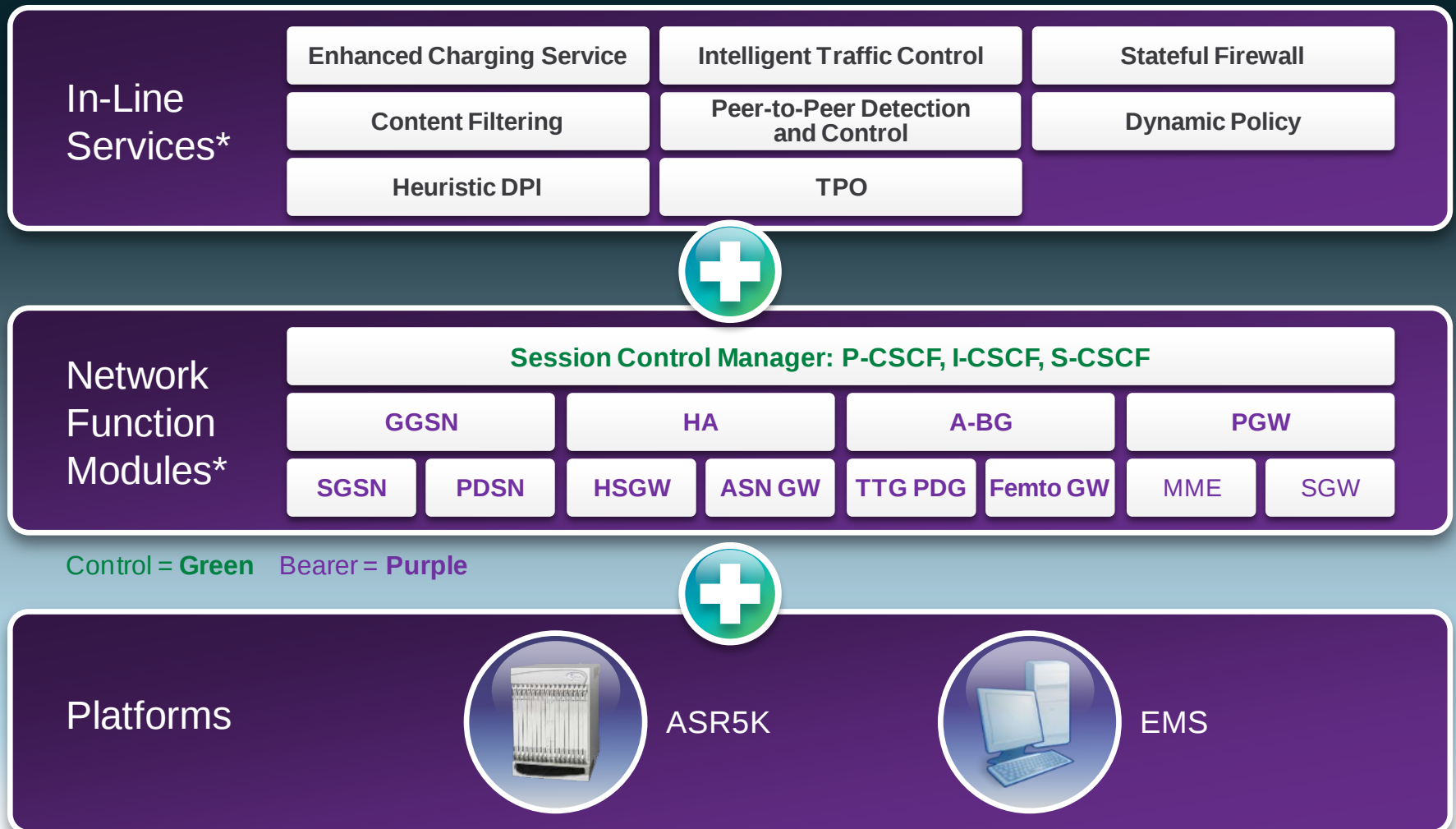


**ASR 5000
Mobile Multimedia
Platform**

- Zero sessions lost due to any single hardware or software failure
 - Fully redundant platform
- Rapid session recovery
 - Automatic recovery of all fully established subscriber sessions
- Inter-chassis Session Recovery (ICSR)
 - Protects against total chassis failures, such as IP routing failures, line-cuts, loss of power, physical destruction, major failure of other network elements or other catastrophic events
- NEBS Level 3 certification
- 99.9999% reliability (6 nines)

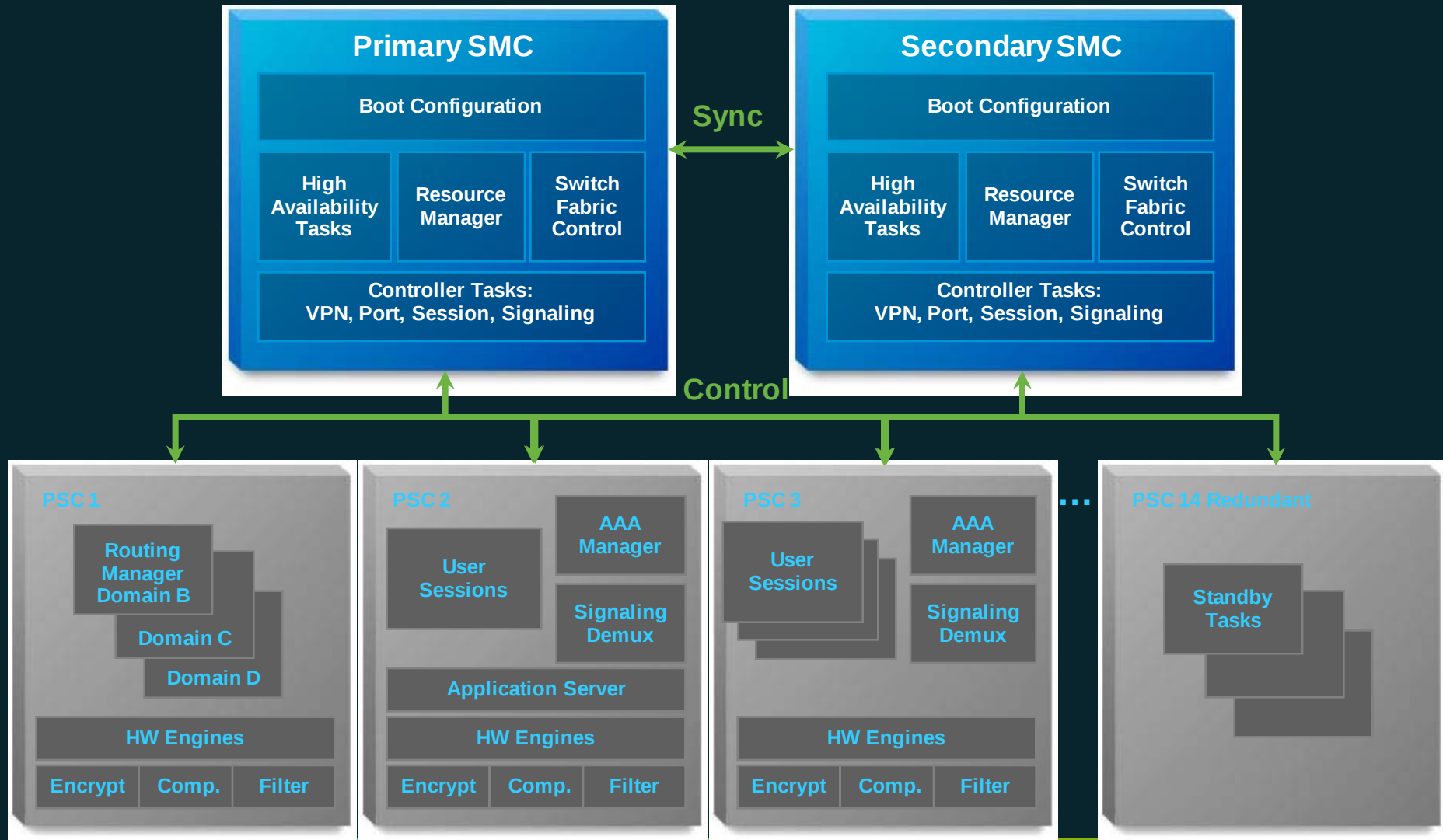
Converged Core: ASR 5000

Separation of Platform and Functions



Software Architecture

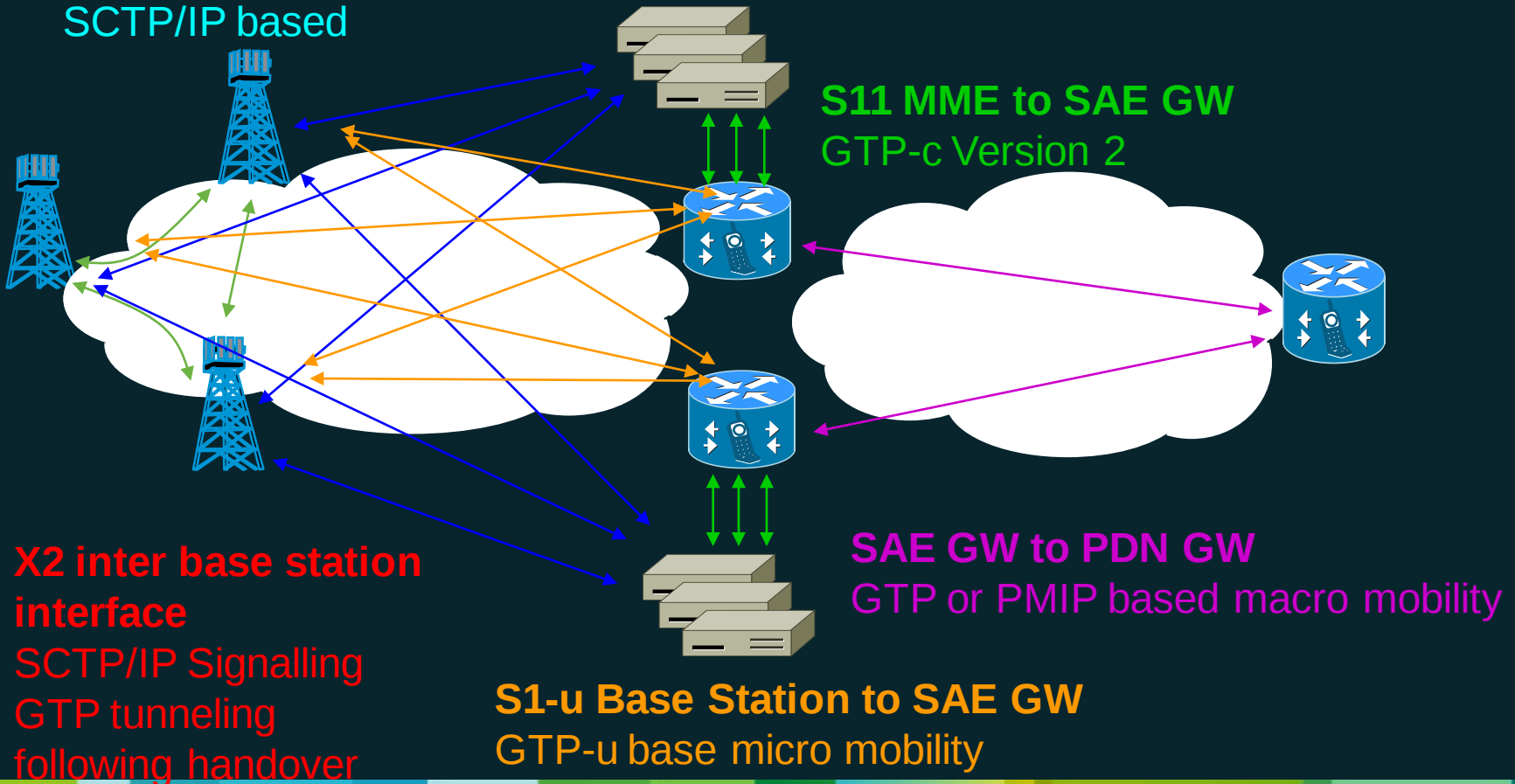
Scalability and fault tolerance



LTE/System Architecture Evolution

S1-c Base Station to MME interface

Multi-homed to multiple MME pools
SCTP/IP based

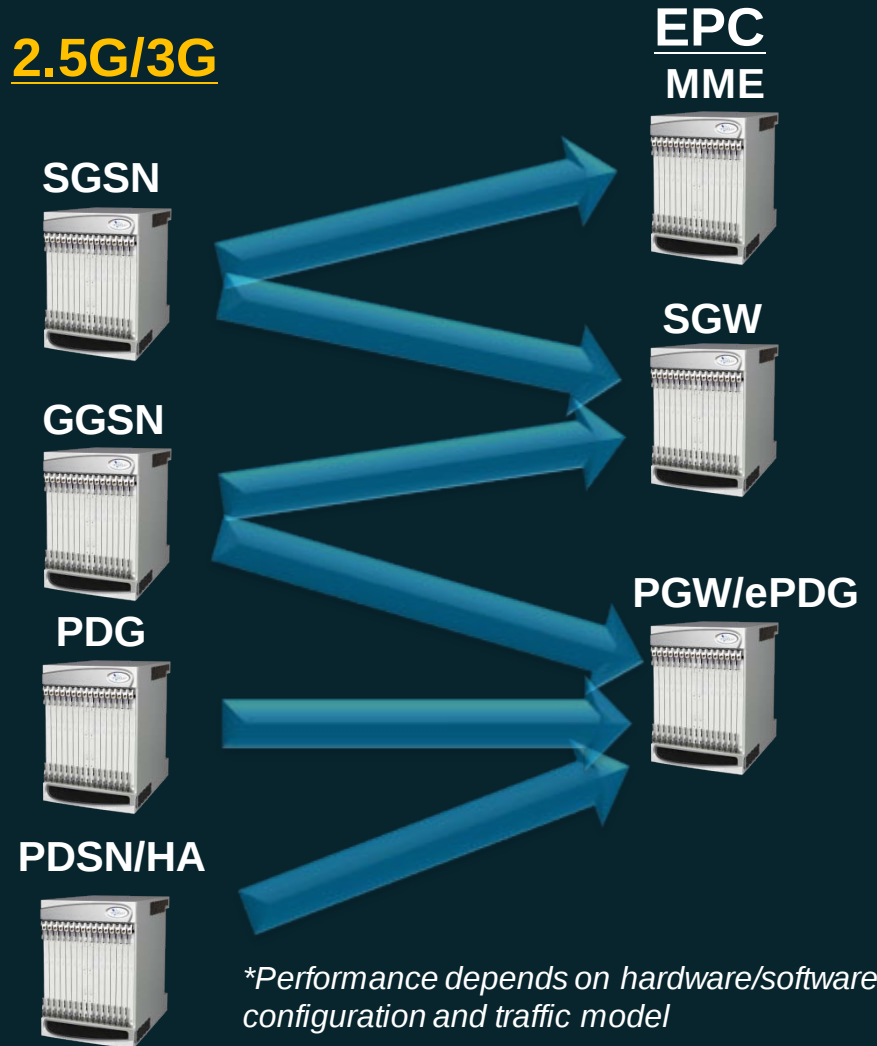


Only Flexible Complete EPC Solution

Seamless Evolution between 2.5G, 3G, and 4G

- Ultra-high performance
 - Most bps, MIPS & memory in the least volume
 - Throughput
 - Sessions
 - Call transactions
- Integrated intelligence
 - In-line Services and policy enforcement with no performance degradation
- Flexibility
 - Multiple functions, integration, seamless migration to 4G
- Voice-grade reliability
- All functional blocks available on the same platform today
 - => no forklift
- Multi access by nature

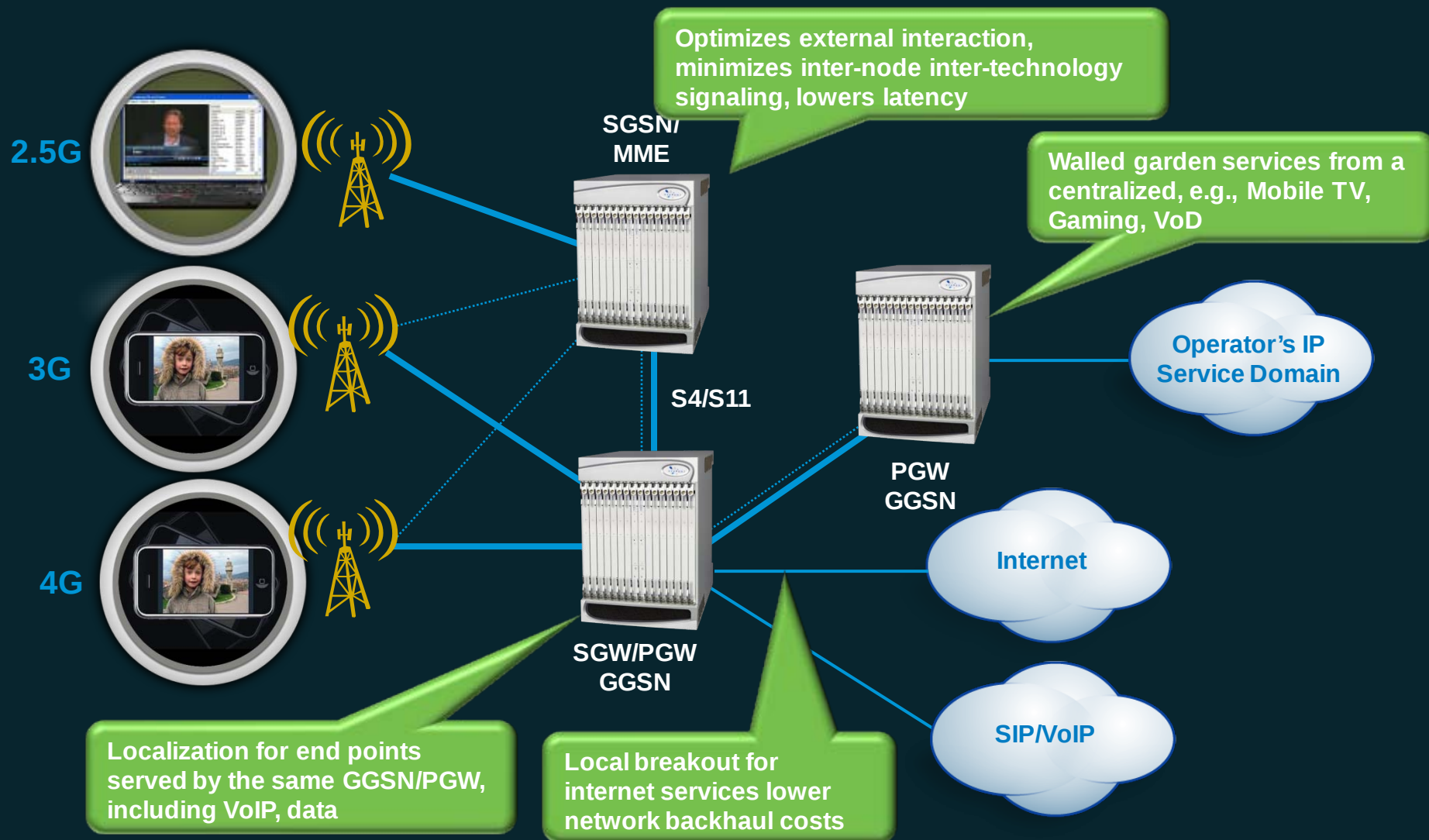
2.5G/3G



**Performance depends on hardware/software configuration and traffic model*

Seamless Flexible EPC

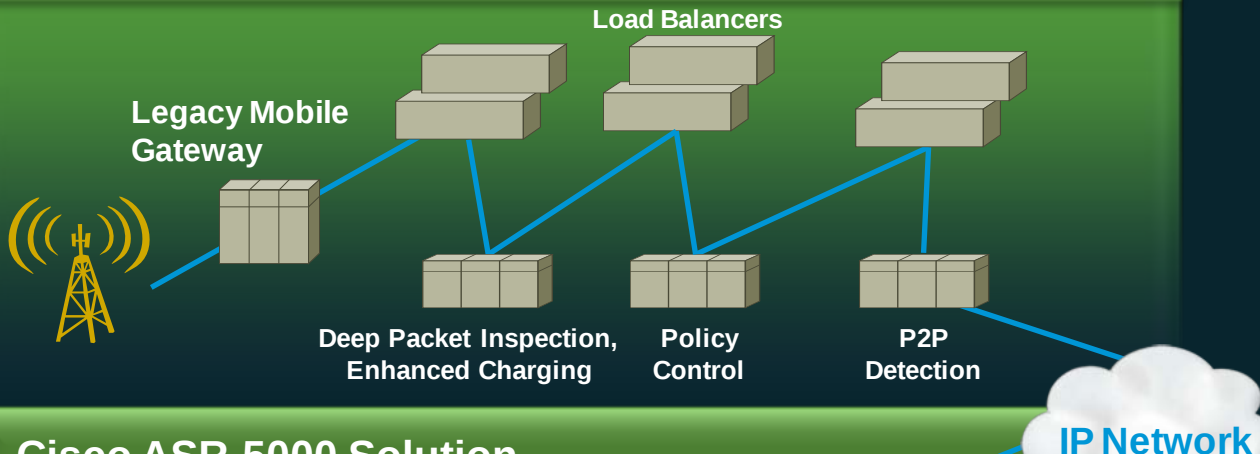
Collapsing Functions



Cisco ASR 5000 In-line Services

Integrated Intelligence

Traditional Multi-chassis Solution



Cisco ASR 5000 Solution



Monetize

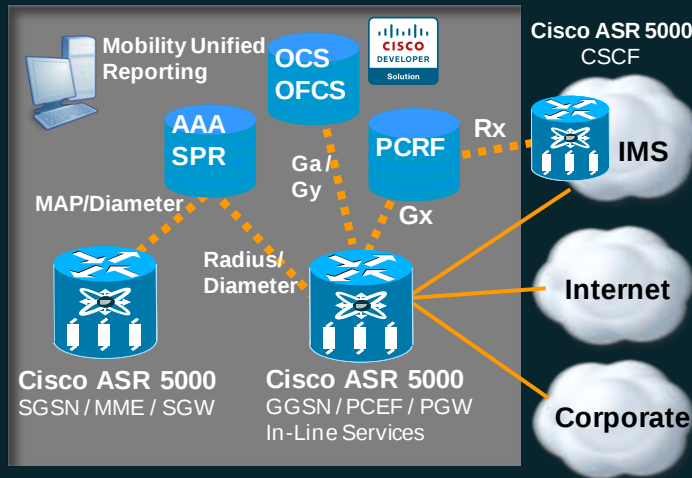
Optimize

Secure

Offer new services, shape subscriber experience, ensure efficient with a faster TTM and lower TCO

Cisco Policy and Charging Control (PCC)

Enabling a Smarter Pipe for Mobile Monetization



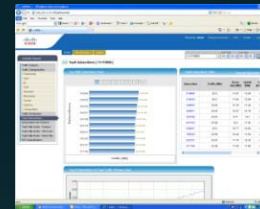
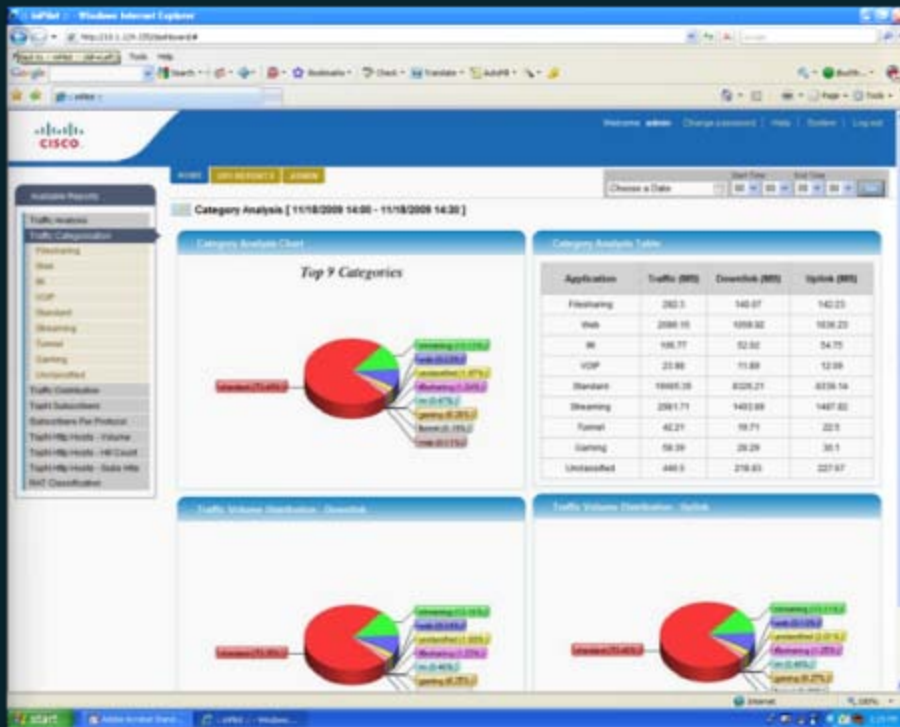
Why Policy & Charging Control?

- Increase customer base and revenues with personalized services
- Transition to a 2-sided, B2B2C business model
- Increase service adoption with dynamic, flexible charging models
- Address network resource allocation and management

Operational Savings of 35%-40% versus Competitive Offerings

Mobility Unified Reporting

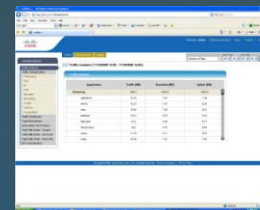
Analysis for Network Optimization, Targeting New Services



**Optimize
Network
Performance**



**Target
New
Services**



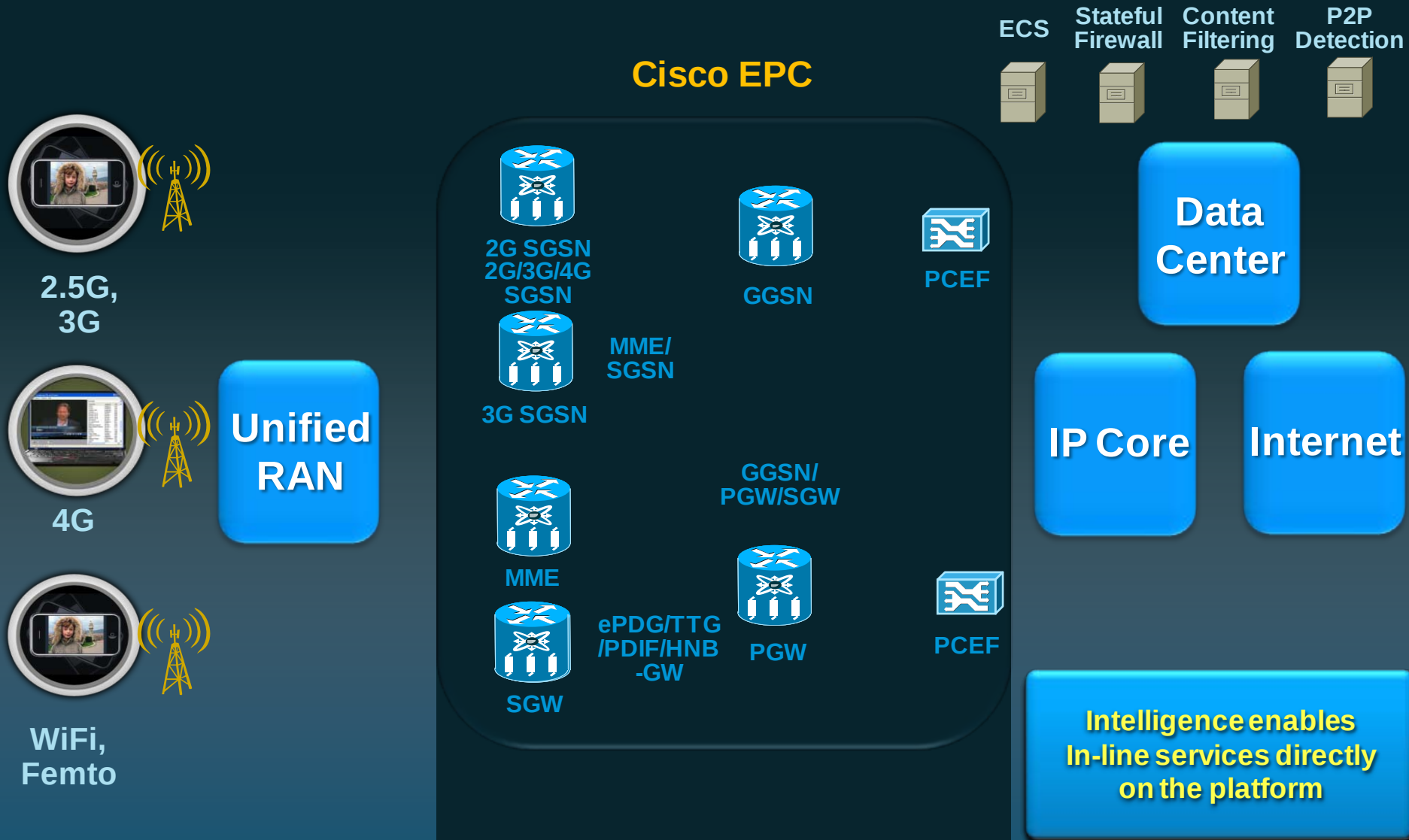
**Plan
Infrastructure
Investments**



Cisco® ASR 5000

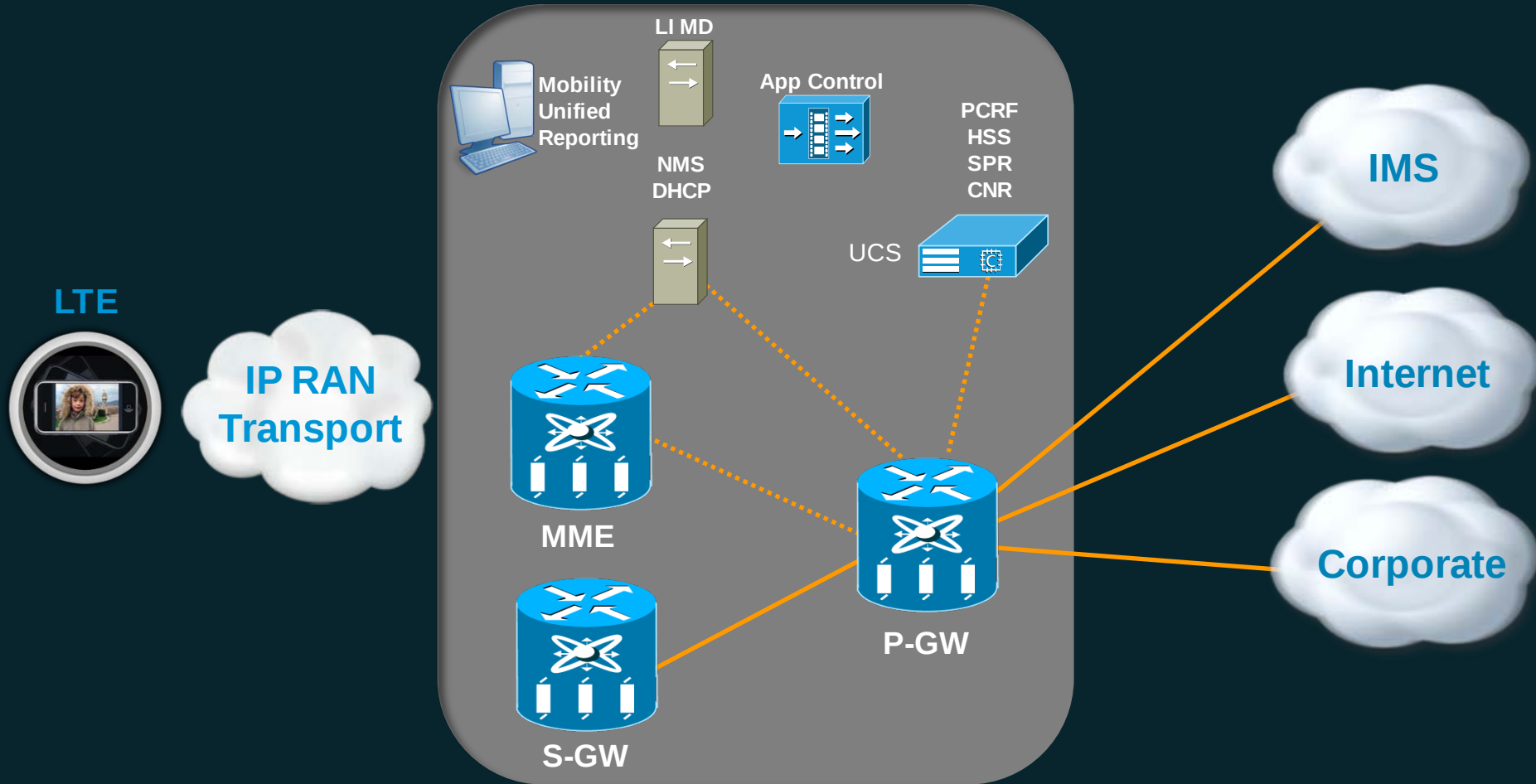
Cisco EPC Solution

Common Core Across All Access Technologies



Mobile Packet Core 1.0

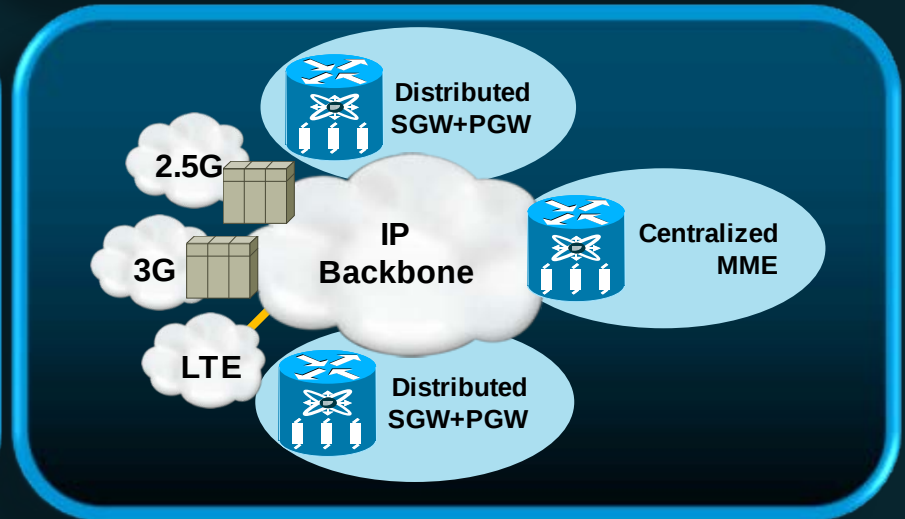
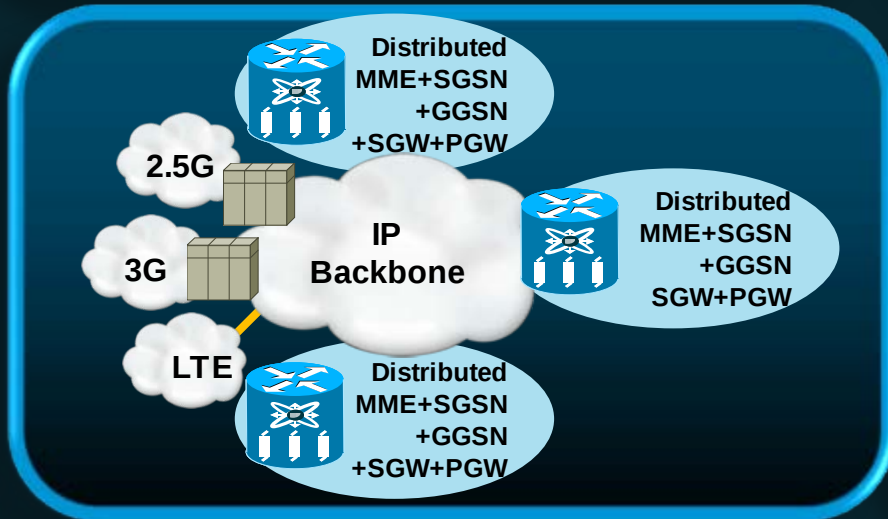
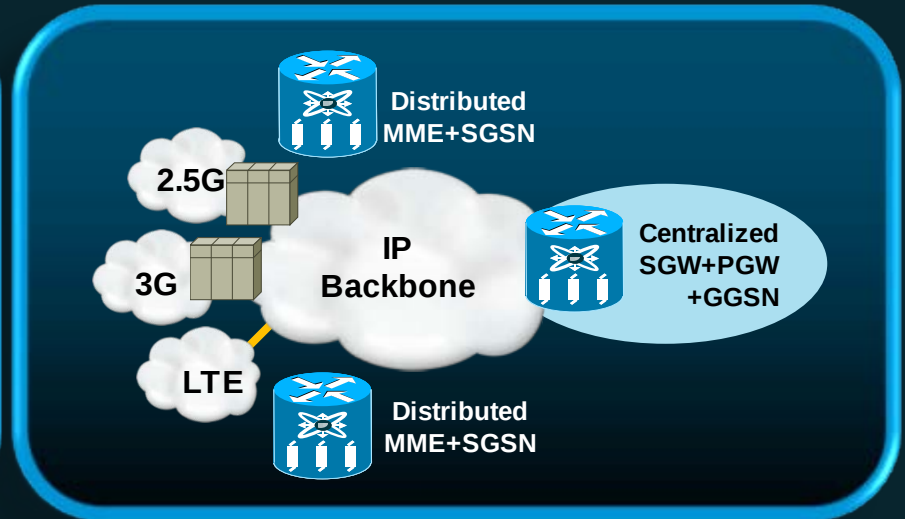
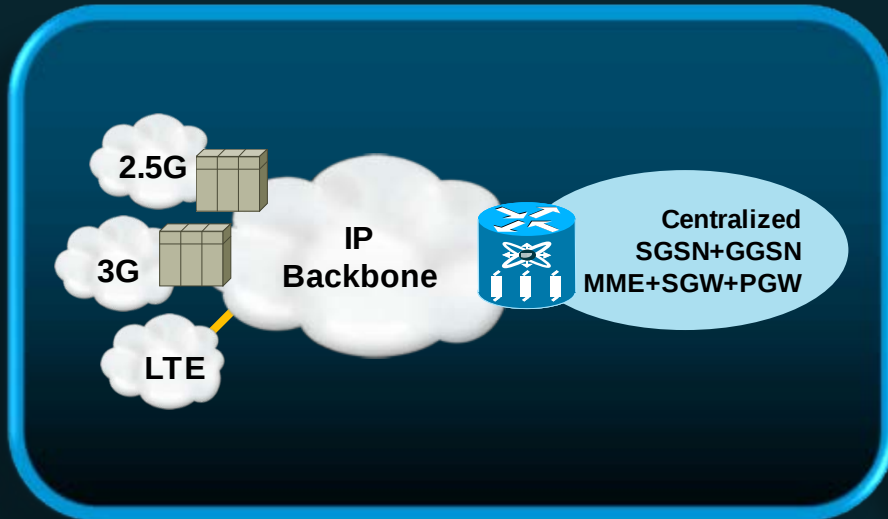
Cisco Validated End-to-End Design



Cost effective, flexible services with systems integration, and alternative commercial and business models

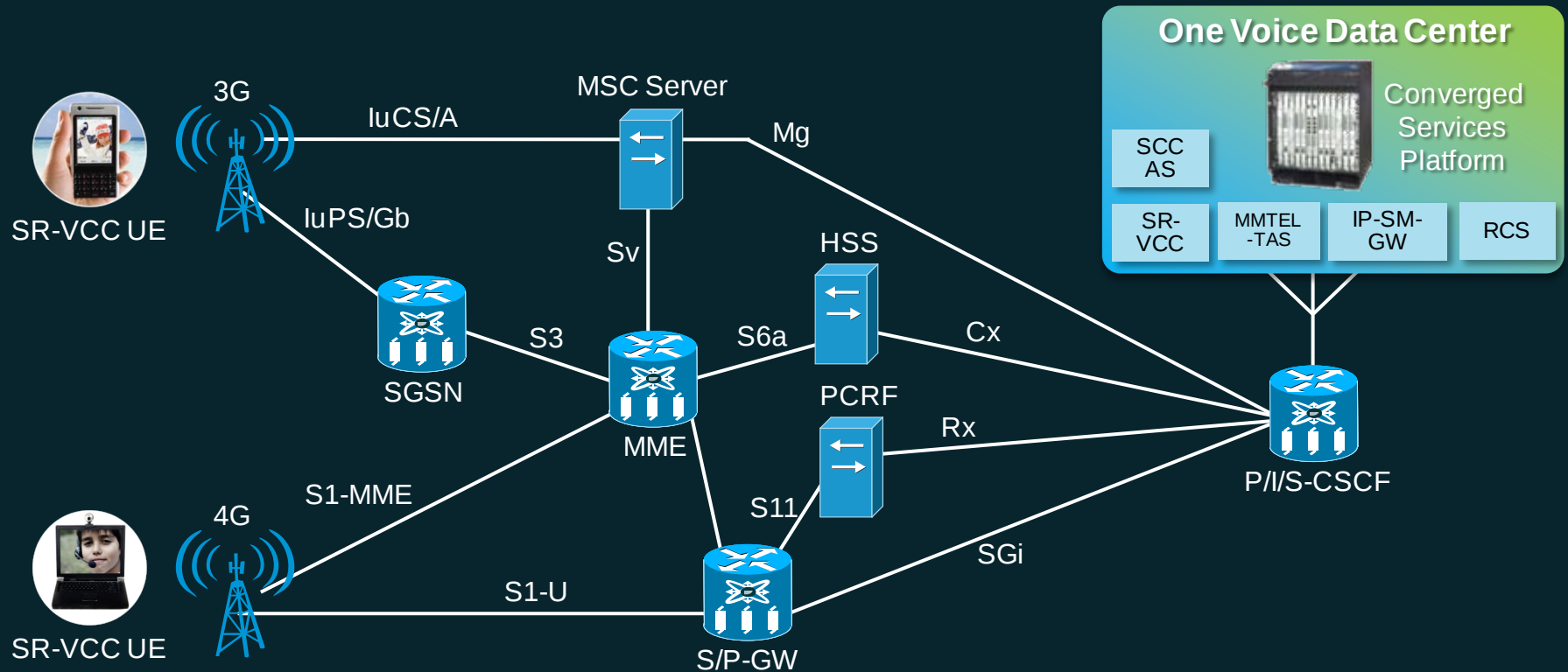
Core Deployment Flexibility

One Size Does Not Fit All



Cisco V²oLTE

One Voice Solution



Integrated IMS
and LTE Functions

Seamless
IMS to CS Mobility

Cost Optimized
Performance

Support for
Messaging, Presence,
RCS

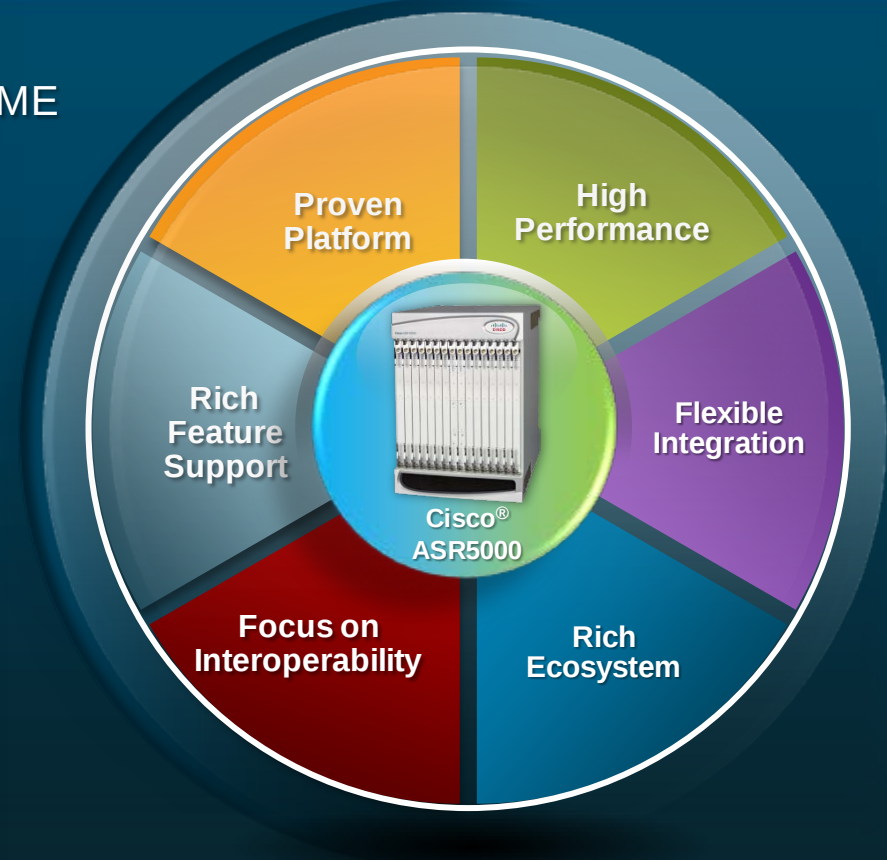
Cisco ASR 5000 Support for VoLTE

SGs Interface Support

- Support for SMS over SGs and CSFB on MME
- Addresses interim VoLTE requirements from NGMN
- Evolutionary option toward full IMS deployment
- Complies with TS 23.272

IMS Support

- P/I/S/E-CSCF application suite integral on the Cisco® ASR 5000
- Highest performance in the industry
- Provides full One Voice compliance
- RFC 3261 and 3GPP SIP support



Cisco ASR 5000 Provides Flexible Options for VoLTE

Monetization



Monetizing the M.O.V.E Experience



2-sided value – 2-side business model

Monetization

Operator Strategies

- On-Net Social Web
- User Generated Video

- Rich Communications Suite
- Operator SaaS

Traffic

Create

Collaborate

- Premium Mobile Video
- Mobile TV
- Mobile Ad-Insertion

- Mobile Cloud Partnerships
- Toll-Free Mobile Broadband

Control

Revenue

- Tiered Pricing
- Family Data Plan
- Turbo Boost

- Parental & Corporate Controls
- Work/Play Plans
- Freemium

Freemium

Increase Customer Stickiness and Upselling

What's the Opportunity?

- Offer access to popular applications (e.g., Facebook) for free for a trial period

How Will This Impact My Business?

- Unlimited access to popular services increases stickiness of service bundles and/or success of new device launch
- New service revenues gained from up-selling after user is “hooked” by free trial

Why Cisco?

- Integrated Charging, Application Detection & Control, Traffic Optimization, and Policy Enforcement lowers OpEx and accelerates Time-to-Market



“Toll-Free” Mobile Broadband

Monetize Traffic Over Flat Rate Plans

What's the Opportunity?

- Application Service Providers (ASPs), businesses, etc. promote usage of applications and rich media web portals by paying for connectivity – “Toll Free” to subscriber

How Will This Impact My Business?

- Generate and monetize additional traffic over flat rate plans

Why Cisco?

- Integrated Charging, Application Detection & Control, Traffic Optimization, and Policy Enforcement lowers OpEx and accelerates Time- to-Market
- Increased 3rd party partnership opportunities



I want to check my Financial Advisor's mobile web portal to access videos, webinars, financial planning tools, etc.

Optimization



Optimization

- Function Integration
- 3G, 4G Integration

- Traffic (TCP, HTTP) Optimization
- Transcoding/Transrating
- Bandwidth Shaping

- Fair Usage
- Resource Management

- Network Offload
- Wi-Fi, femtocell Offload

Lower radio costs

Increase network capacity

Enhance customer experience

Increase network efficiency

Reduced latency

Potentials savings of 10% to 30%*

*specific services, based on several network variables

Traffic



Function Integration

Video / Data

Policy

Traffic Packet Optimization

TCP, HTTP, Transrating

Potential reduction of up to 15% in video traffic

45%

Potential reduction of 30-50% in non-compressed text pages

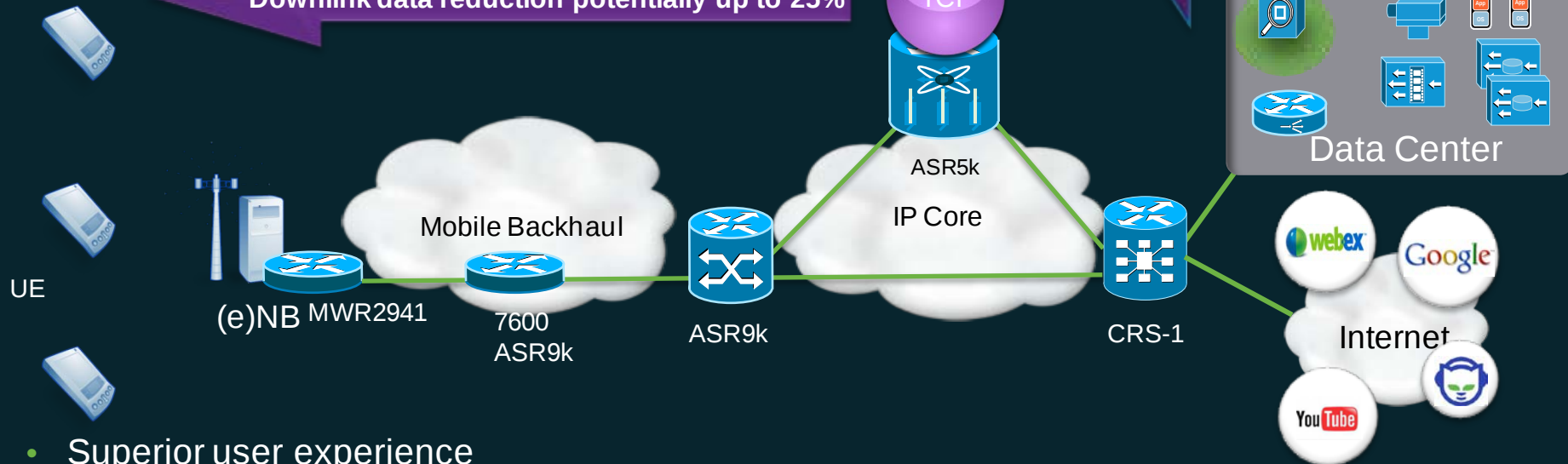
Downlink data reduction potentially up to 25%

Transrating

HTTP

TCP

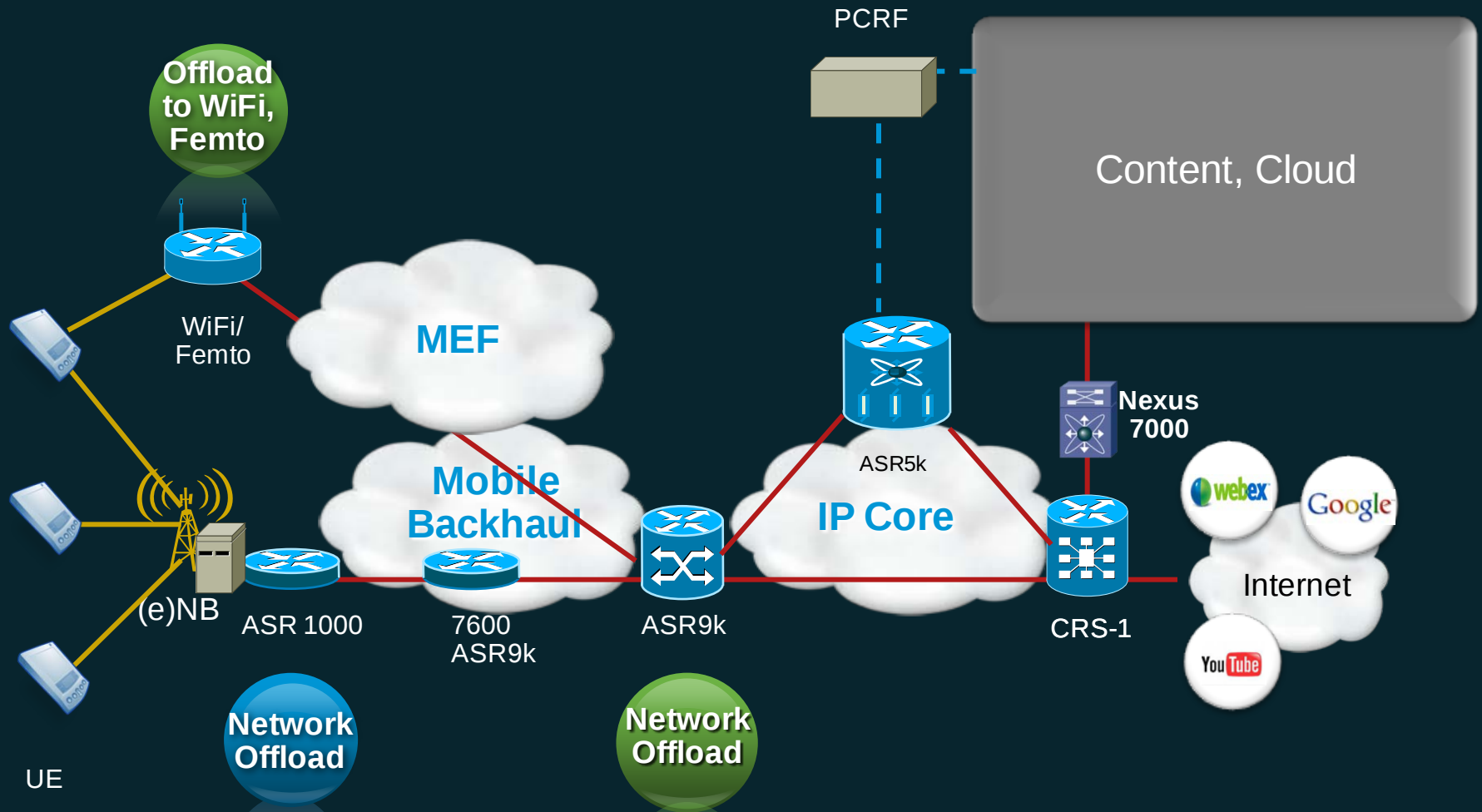
Data and Video Tsunami



- Superior user experience
- Superior mobile bandwidth utilization
- Solutions for both data and video
- In-line capabilities reduce Opex and additional 30-40% over external solutions

Mobile Offload Solutions

Multiple Options



Network, WiFi, Femto Offload

Use Case – Fair Usage & Throttling

- Top User report

Top subscriber transferring 270GB in one month

Top 1000 contribute 40% to total traffic

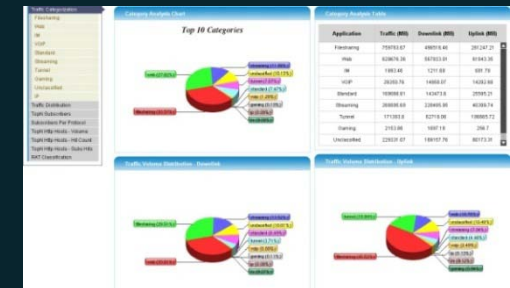
Allows operator to fine tune Fair Usage limit to generate enough capacity reduction and minimize the number of subscribers affected

- Protocol by family

P2P was higher than expected (~25%)

Busy period much longer and later than anticipated

Able to refine throttling strategy to minimize impact to end users and preserve capacity for things that are critical to the operator



Throttling need to be used carefully to preserve the subscriber experience

Real Customer Experience – Tier 1 in EMEA (2 Months from Request to Deploy)

P2P traffic reduced from 25% down to 15% of the total traffic, no unexpected data traffic increase in the last 6 months

Real Customer Experience – different Tier 1 in EMEA

Reduced traffic by 30% on network

Optimization Business Analysis?

TPO, Video Optimization, Wi-Fi Offload, Network Offload

OPTIMIZATION



- Cisco's intelligent core solutions reduce RAN costs by 10% – 30%
- Potential savings
 - Up to \$700M in overall network savings
 - Up to \$40 for each \$1 invested
- Radio vendors will be reluctant to develop solutions with such savings
- Solutions significantly improve the user experience

Cisco Services



Cisco Services on the MOVE

Migrate, Optimize and Monetize



End to End Lifecycle Services – Migration, Integration and Customization



Megatest Validation



Mobile Mega Test Objectives

Comprehensive

Largest, most in-depth test, including:
Data Center, IP Core, Mobile Packet Core,
and IP RAN Backhaul

Independent

Light Reading - EANTC
Testing not funded by Cisco

Realistic

Test simulates **realistic mobile operator's network** for 2G, 3G and LTE

Mobile Megatest

Tested Cisco Comprehensive Architecture



Nexus 5000
Nexus 7000



UCS

**Data
Center**



ASR 5000

**Packet
Core**



CRS



ASR 9000



7600



ME 36/3800



ASR1000

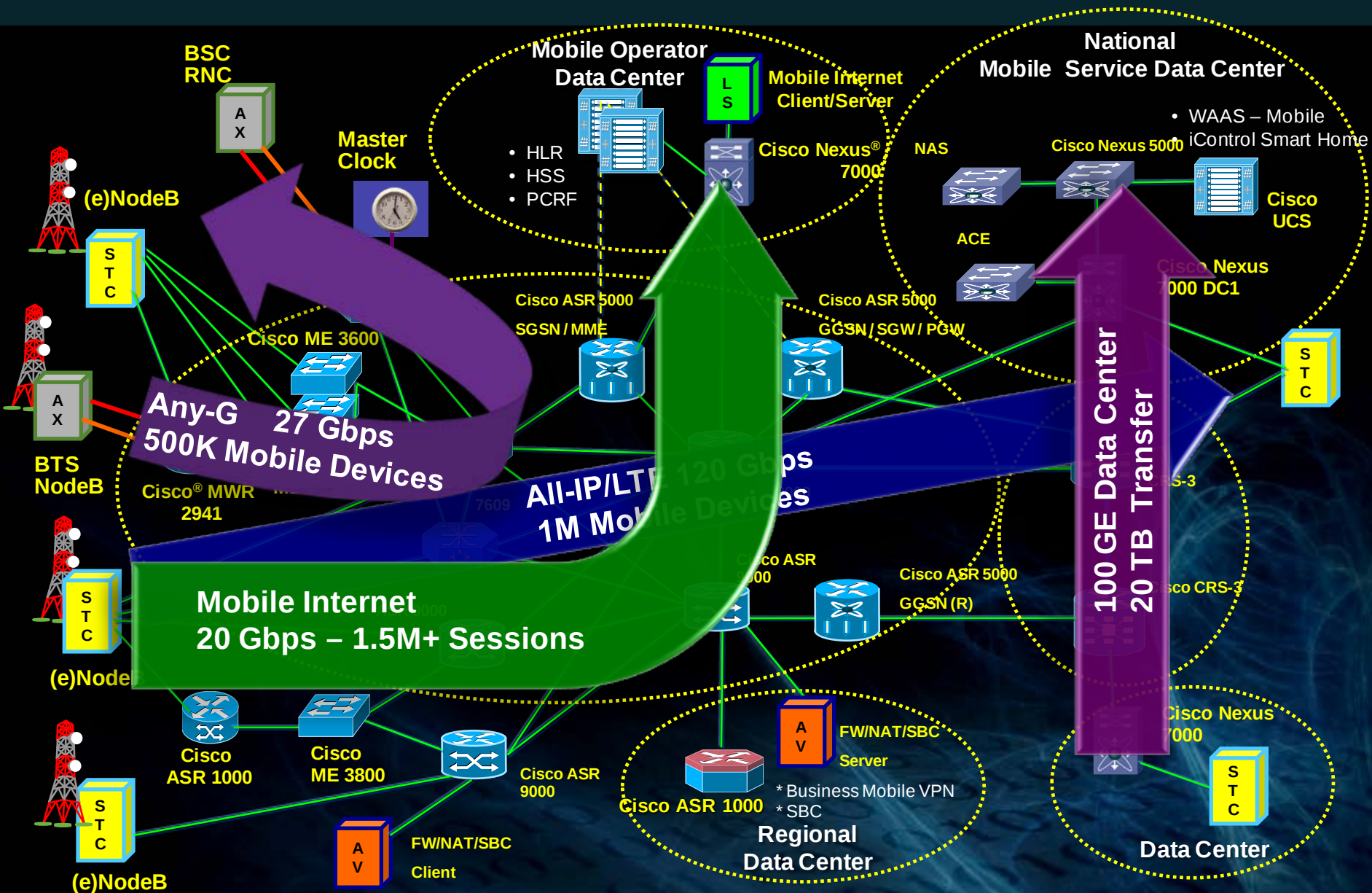


MWR 2941

**Mobile
Transport**



IP NGN Mobile NGN Test Architecture



Industry Firsts & Bests

Customer Value

Great User Experience
Reduce Latency - Less Disruption

Faster ROI – Easier GTM

Give your customers the
most reliable service

Graceful Any-G Migration

Scale Machine-to-Machine
Be **"2011-Ready"** for IPv6

Most Reliable Network and
Faster, Easier Upgrades

Solution Capability

20TB in under 30 m
Overlay Trans. Virtu

4X Efficiency and S

Zero Session Loss
(Card, Processor, P

2G, 3G, 4G Packet
3G – LTE Handoff a

1 Million/Sec. IPv6
2X Performance

Zero-Loss Failover
Non-Stop Upgrade

**Data
Center**

**Packet
Core**

**Mobile
Transport**

“ The ASR 5000 mastered the **integrated 100% DPI configuration without any noticeable issues**. Sessions were activated, maintained and packets forwarded under emulated load exactly as in the previous test without DPI ”

Competitive Landscape



Network + Content + Mobility = Cisco

Cisco Evolved Packet Core Value Proposition

End-to-End

- Cisco Validated Design IP mobile multimedia packet core architecture
 - Intelligence to profitably deliver, monetize, and optimize multimedia services
 - Scalability = transaction rate + throughput + density + latency
 - Flexibility: Radio access independent, single node for multiple functions;
 - Software migration to 4G/LTE
 - Backend server consolidation (UCS) of subscriber management functions
 - Evolution to end-to-end architecture

Turn-Key Solutions

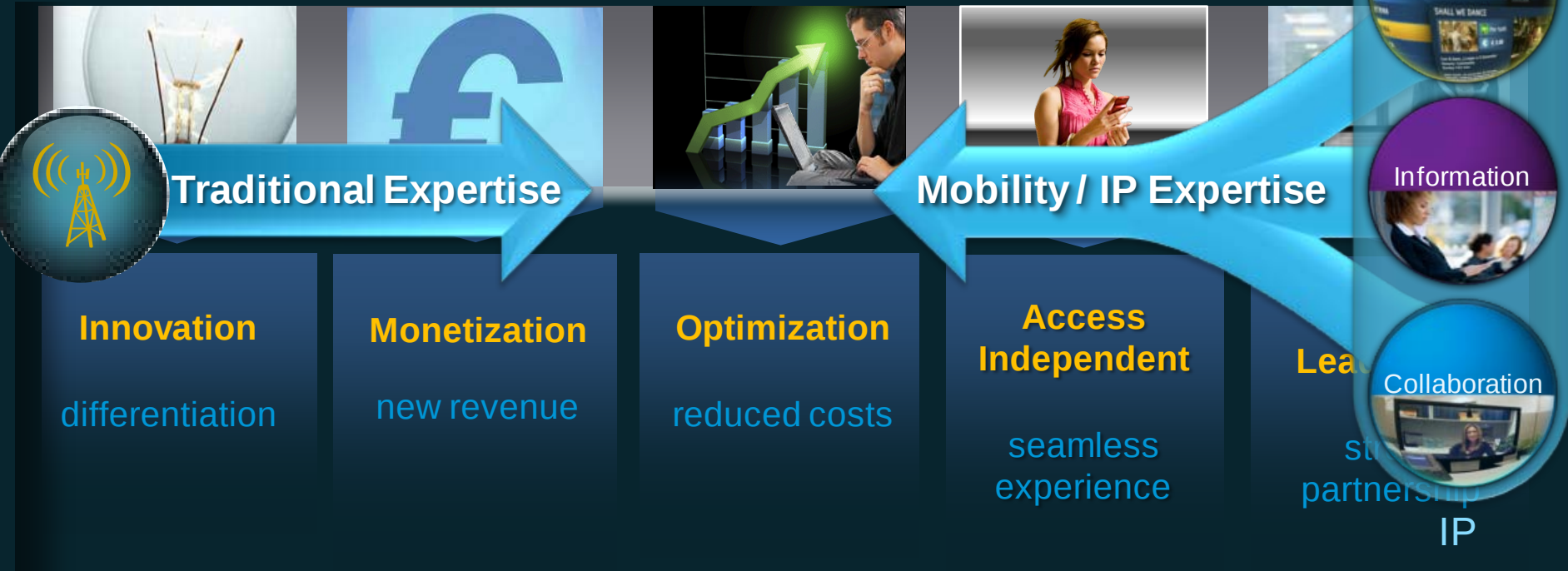
- Cost effective solution for customers
 - Maximize profitability and reduce churn
 - New revenue generating services
- Flexible Services that include thought leadership/ consulting, network readiness & planning, system integration

Win-Win Business Models

- Agile customer focused model
 - Single point of contact
 - Risk mitigation and faster time to market
- Alternate commercial and business models
 - Pay as you grow, risk sharing

Cisco Mobile Internet

Trusted partner for the **global Mobile Service** Providers



Thank you.

