IP Core – Architecture Trend Policy Management

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Agenda

- IP Core – Current trend
- What is NGN/IMS? Why NGN/IMS?
- NGN Challenges
- NGN architecture
- Conclusion

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Agenda

- **IP Core – Current trend**
- **What is NGN/IMS? Why NGN/IMS?**
- **NGN Challenges**
- **NGN architecture**
- **Conclusion**

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IP Core - Four Trends

1. TDM is past its prime

- Built primarily for voice, and adapted reasonably successfully for leased lines, fine-grained TDM (PDH/SDH) is increasingly irrelevant for Next Generation Networks
- TDM is also very expensive on a cost/Gbps basis

2. Packet transport is on the rise

- There is recognition that transport must focus on packets, not bits
- There are multiple approaches, and a lot of confusion out there

3. Interest in the Packets+ Photons Phenomenon is growing

- There is also recognition that the worlds of packets and of optical transport must come together
- Again, there are several approaches, and no clear way forward

Policy Management

- Common Core – Multiple Service
- Resource Admission Control for the Application and services

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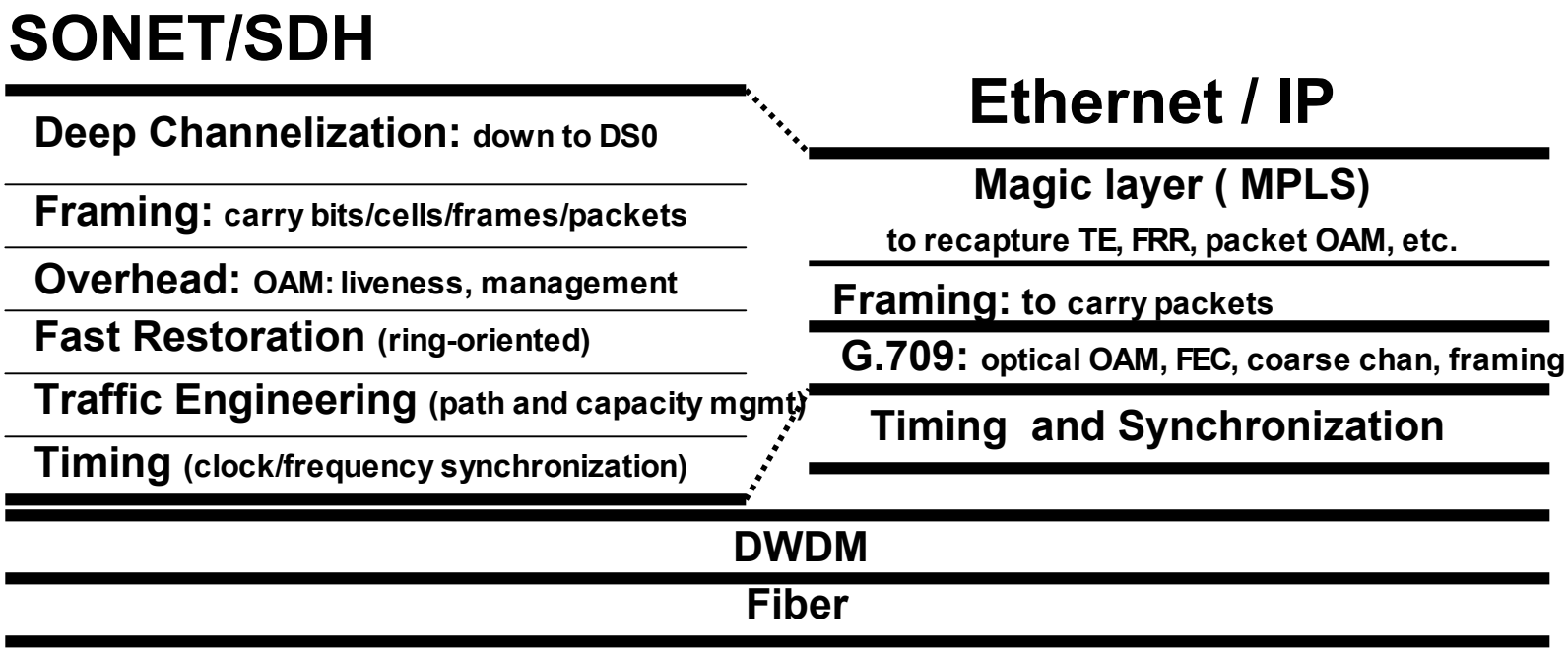
Transition to Ethernet

Migrate from SONET/SDH to Ethernet + "magic layer"



Removing functions that are no longer required leads to savings

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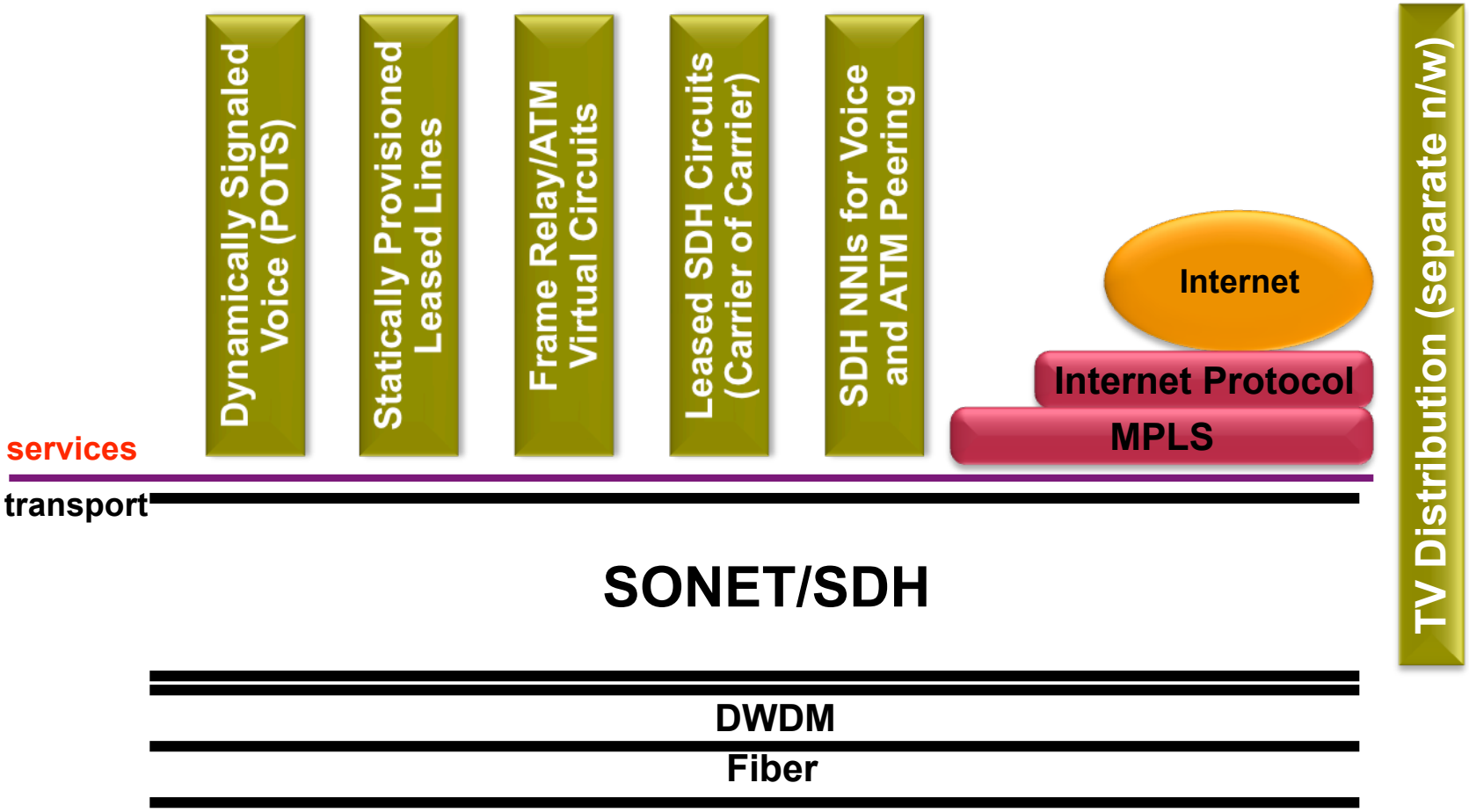
Picture from the Past (20/15/10/5 years ago)



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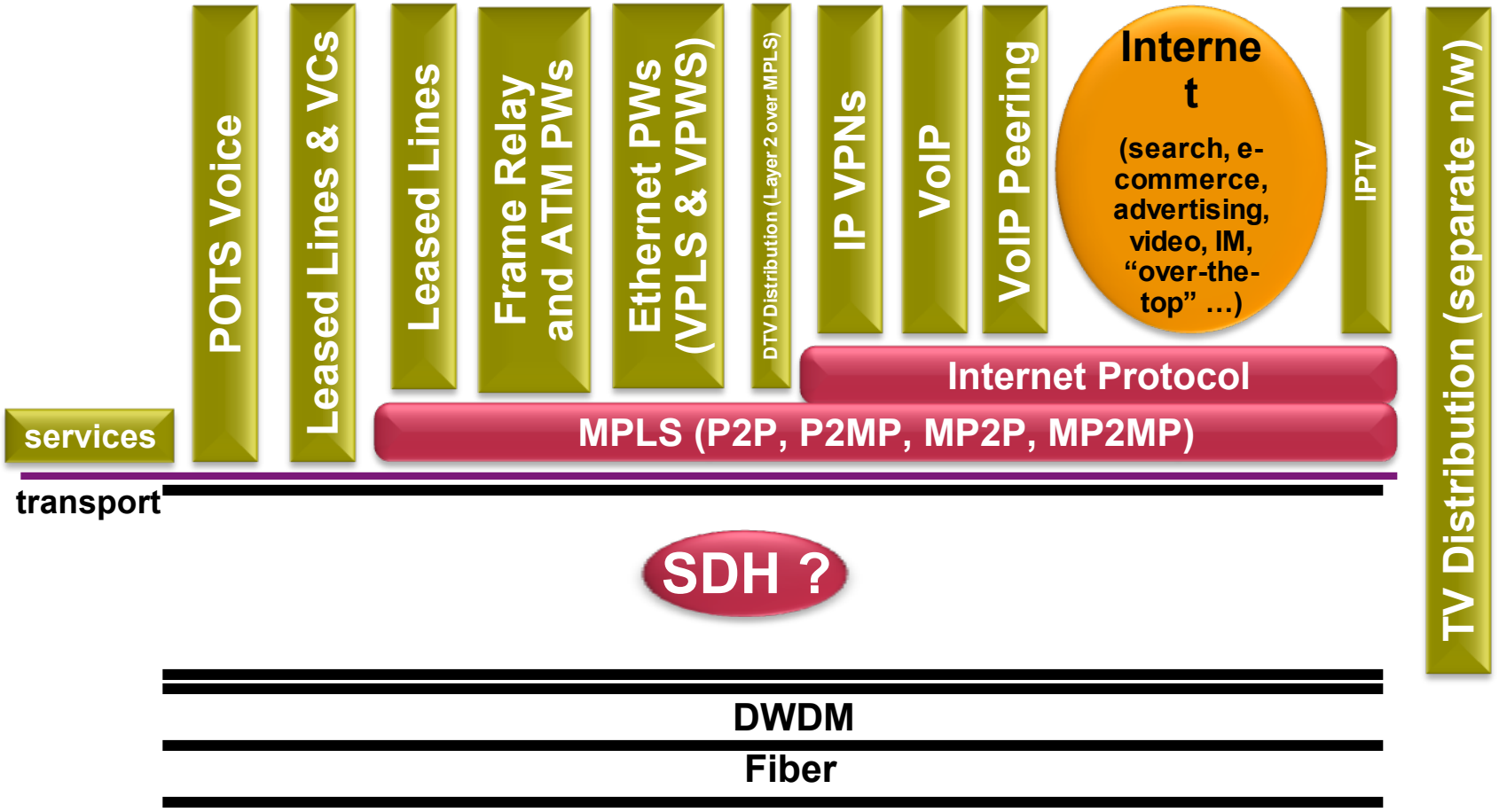
Picture Today



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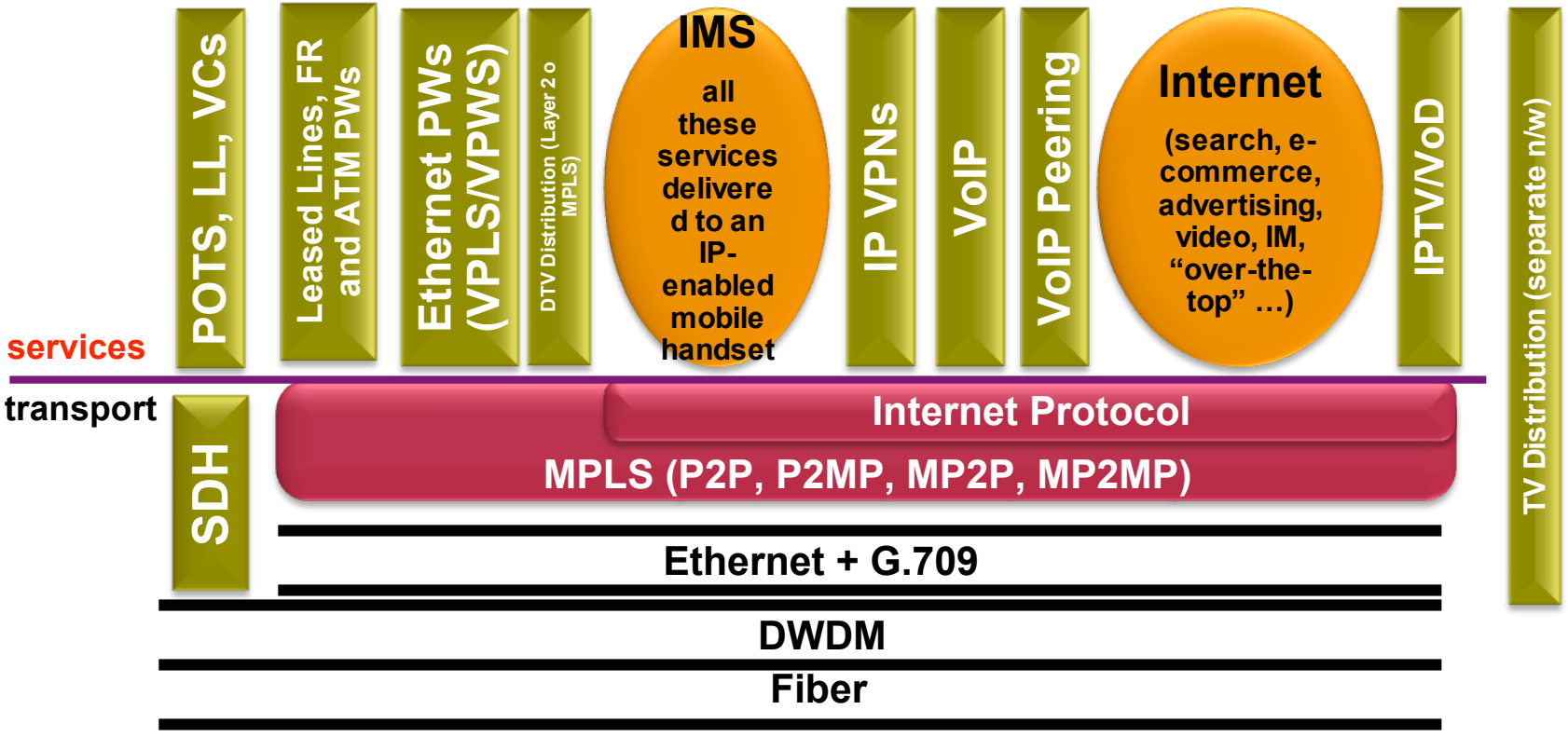
Picture in a Couple of Years



This maintains the synergy between MPLS and IP and has the right partition between infrastructure/services

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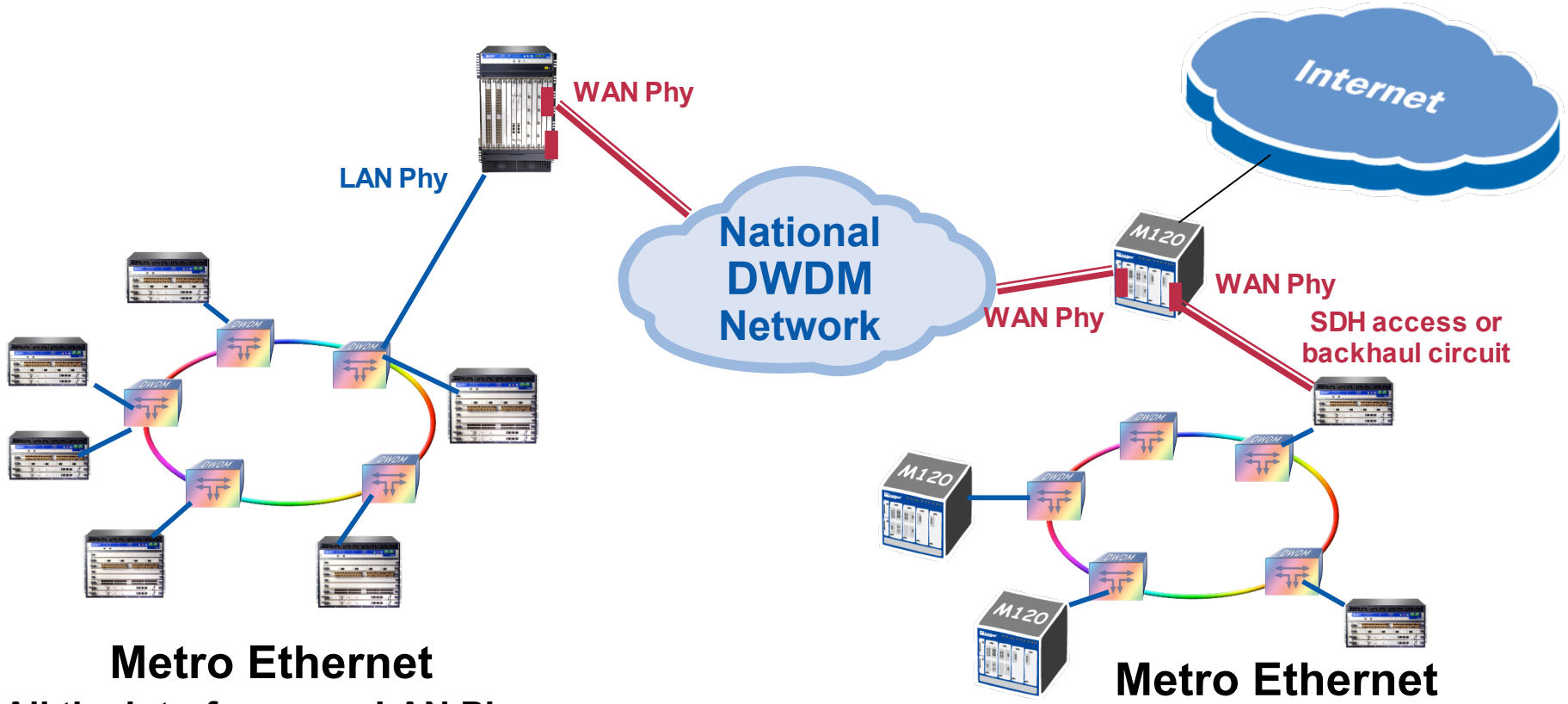
10GE LANPHY / WANPHY

- 10GE Bit rate is 10.x Gbit/s
- Ethernet payload is within the STS-192c envelope 9.58464 Gbps
- IEEE 802.3ae defines the Tx characteristics of the 10GE WAN Phy.



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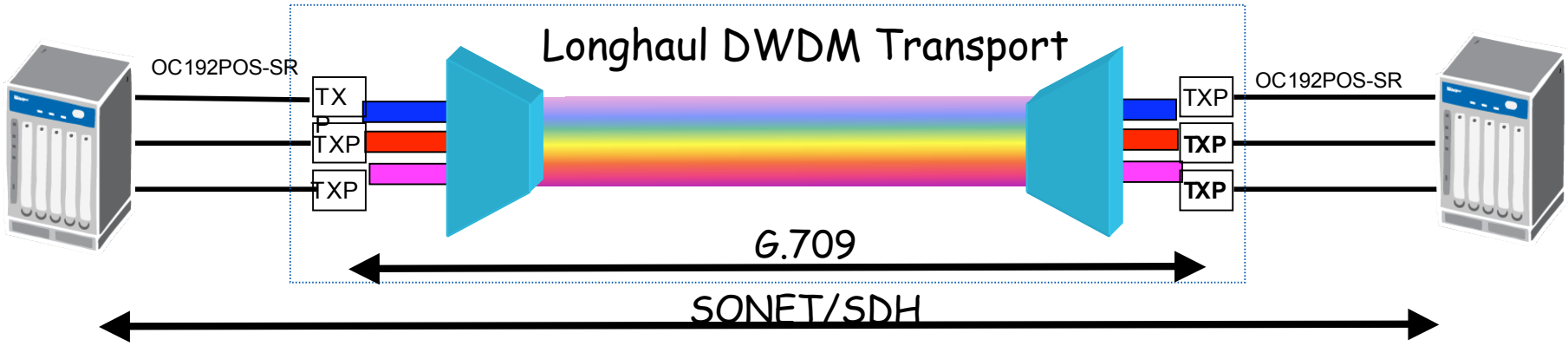
WAN Phy application in Optical Core



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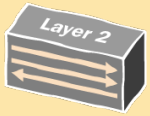
Access Network - Trend

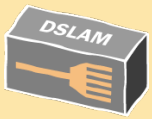
Applications

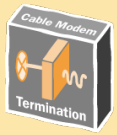
Policy & Control

Customers

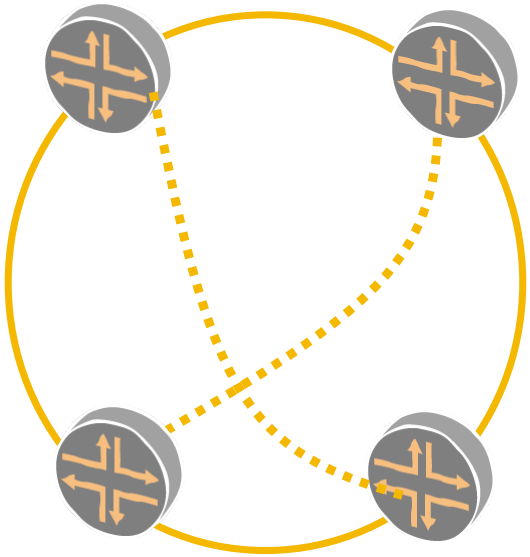
Access







Carrier Ethernet



IP Service Delivery Points

BSR

MSE/PE

Service Providers

Transport

Wholesale

Customers

Access

Cable, FTTx, EPON, Wimax
WiFi, RAN, MSAN

Carrier Ethernet

Edge

Core

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High Availability – good terminology use

As defined by Telcordia:

Percent Availability	Number of Nines	Outage Time (Minutes/ Yr)	Service Quality Level
99%	2-Nines	5,000 m/y	moderate
99.9%	3-Nines	500 m/y	well-managed
99.99%	4-Nines	50 m/y	high availability
99.999%	5-Nines	5 m/y	very high availability
99.9999%	6-Nines	0.5m/y	Extremely high availability

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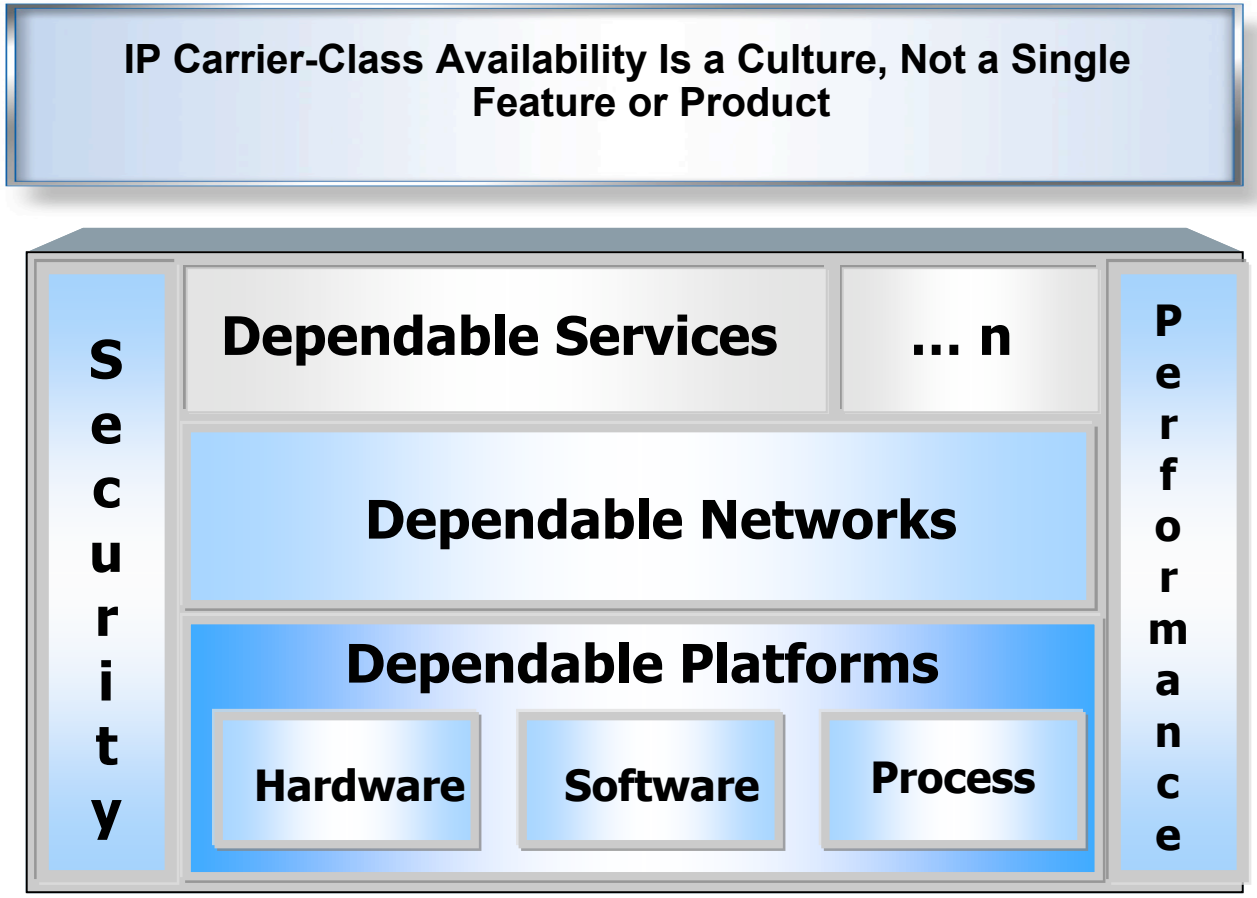
IP Core Design – Frame work



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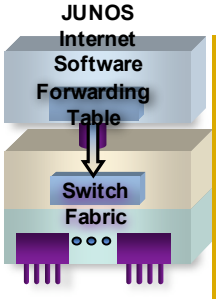
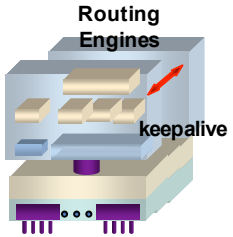
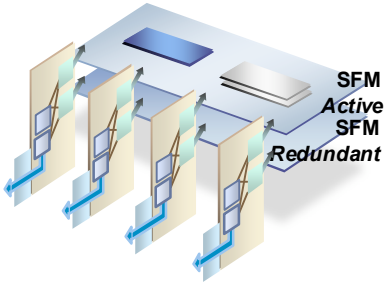
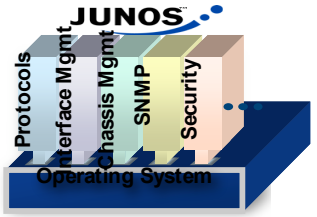
Elements of Highly Available Services

System Architecture

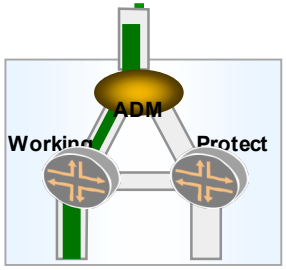


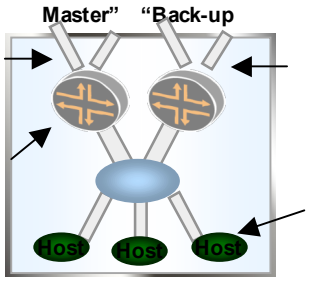




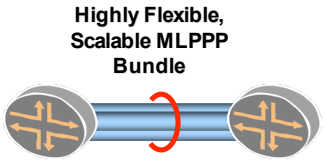


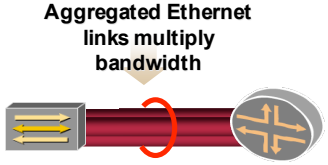
Node-level Resilience

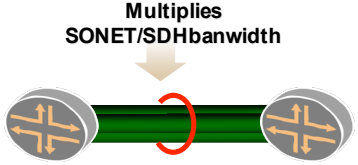




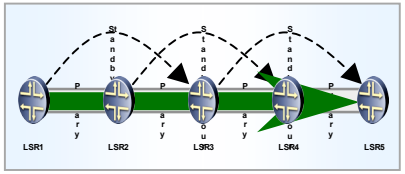
Link-level Resilience

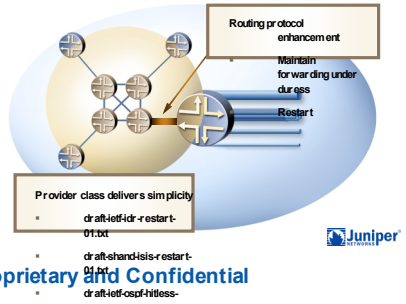


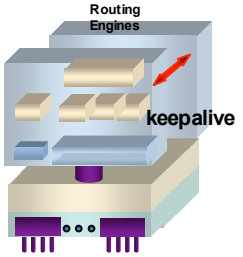




Upper Layer Resilience







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Agenda

- IP Core – Current trend
- What is NGN/IMS? Why NGN/IMS?
- NGN Challenges
- NGN architecture
- Conclusion

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Key Market Trends for Service Providers Need for Network wide Policy Management

- **Traffic Growth**
  - Estimated bandwidth in core: x4 in 3 years
  - Driven by new applications and new users
- **Network Upgrades**
  - CAPEX increase for most service providers
  - Driven by Traffic Growth and NGN
- **Revenues Plateau**
  - Typical CAGR of 5%
  - More intense competition
  - Issue with Revenue distribution: Revenues shifting to Content and Application providers ; Is there value in the network?

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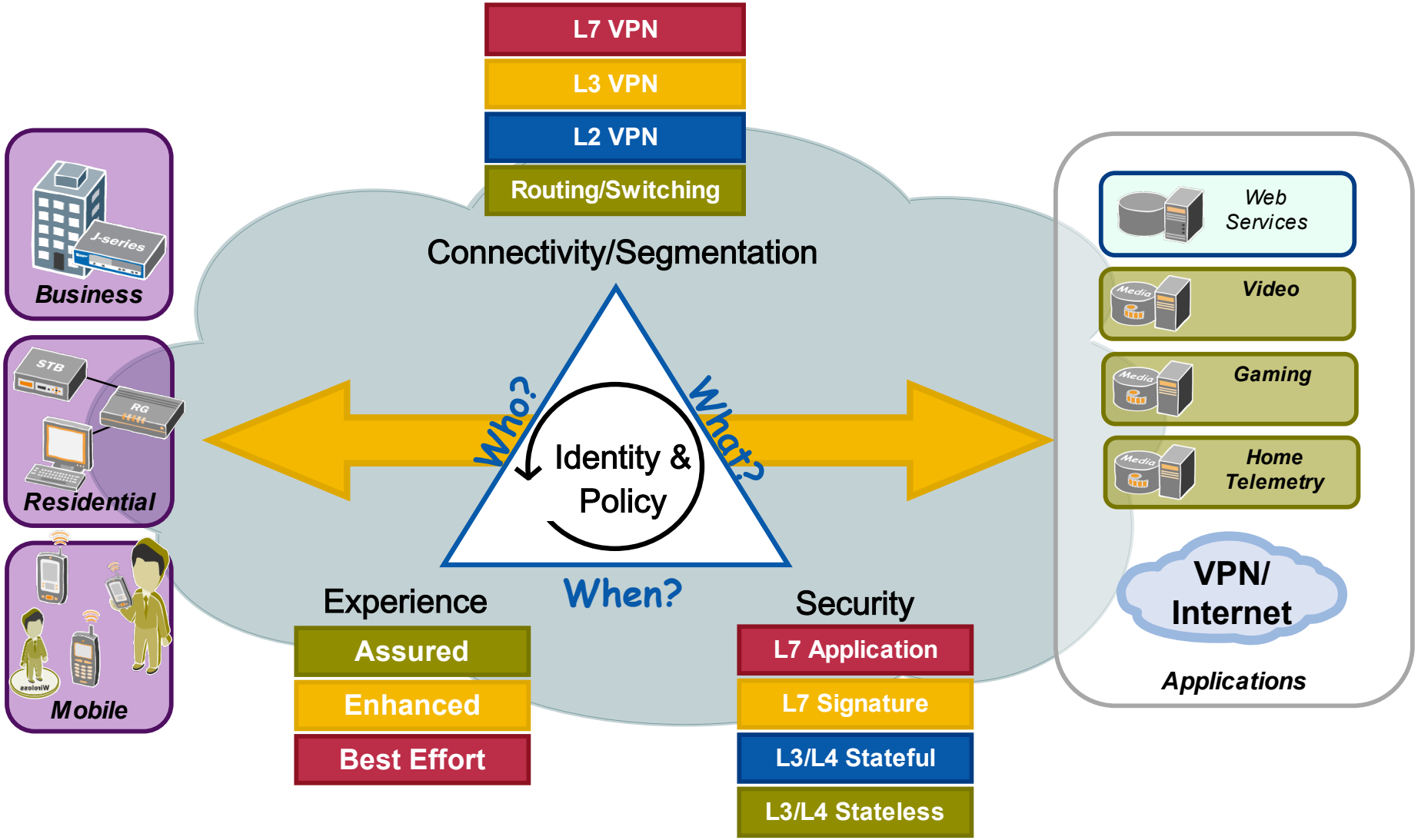
The Role of the IP Core Network



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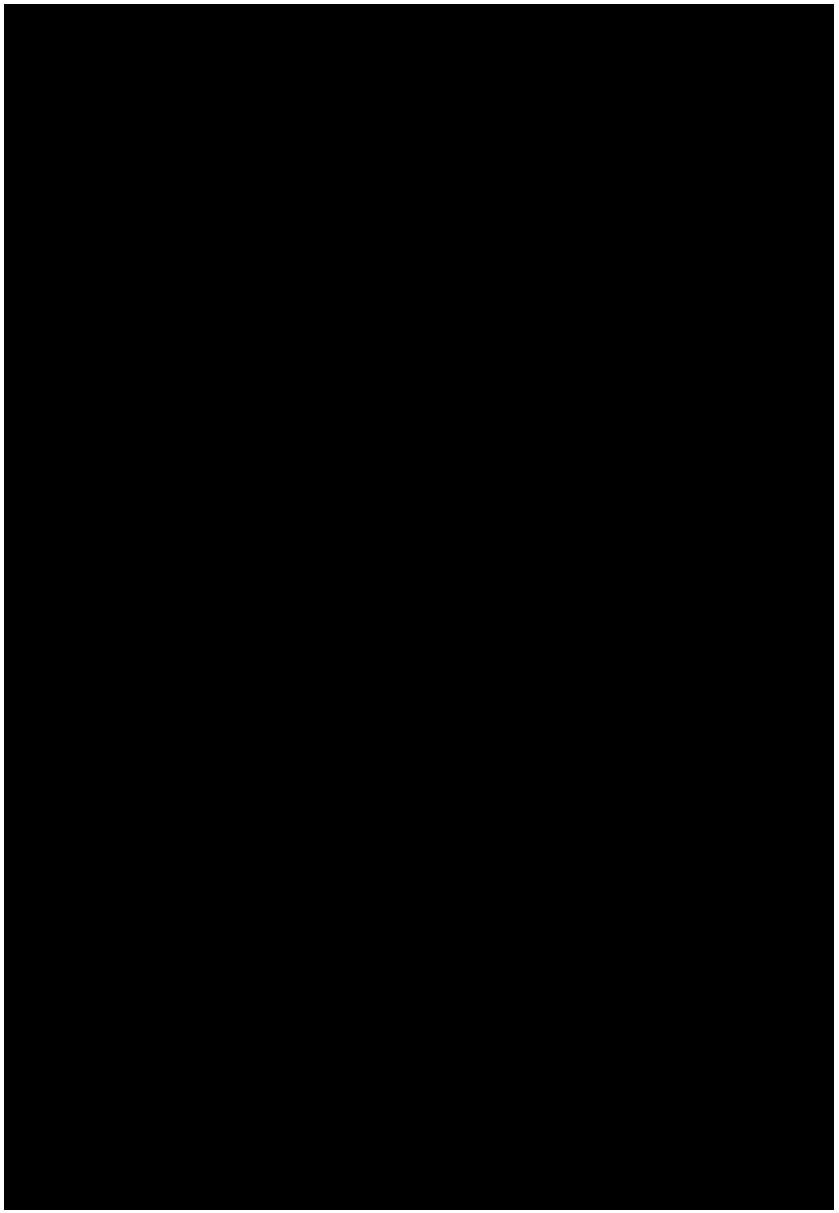

What is NGN/IMS?

IMS = IP Multimedia Subsystem (3GPP)
FMC = Fixed Mobile Convergence (TISPAN)

Architectural framework for service provider infrastructure to offer existing and new services in an access-agnostic manner over a common IP infrastructure

Applications of IMS-FMC

IPTV, VOIP, Push-to-Talk, Peer-to-peer gaming, etc.

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Copied from at&t … ☺

Three screens of the future:
Anytime, anywhere communications

Page 12

at&t

"…IMS's main appeal is it's ability to provide *more applications faster* and *at lower cost*, but *fixed/mobile convergence* is an important motivator."

Heavy reading, July 2005

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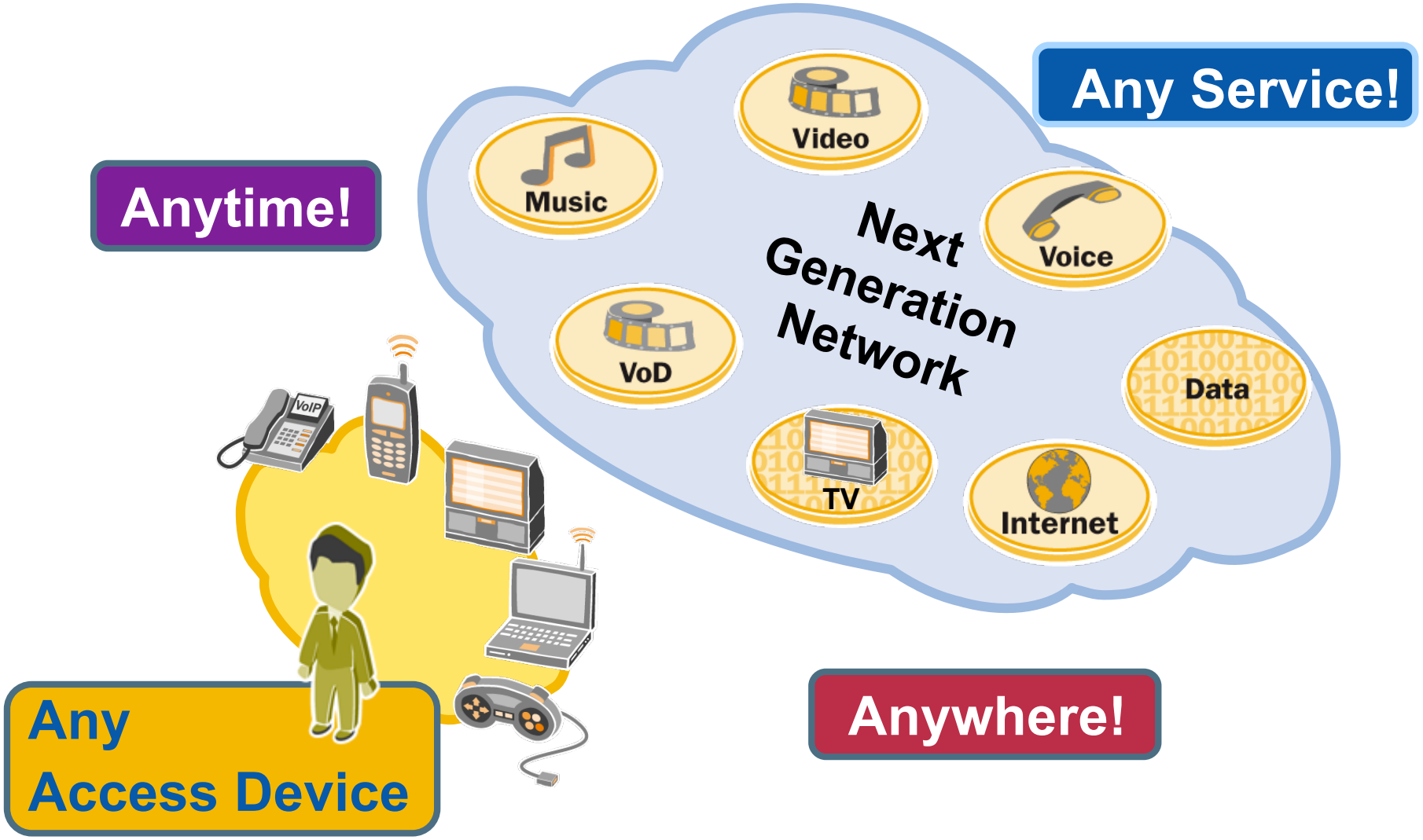
The NGN Concept



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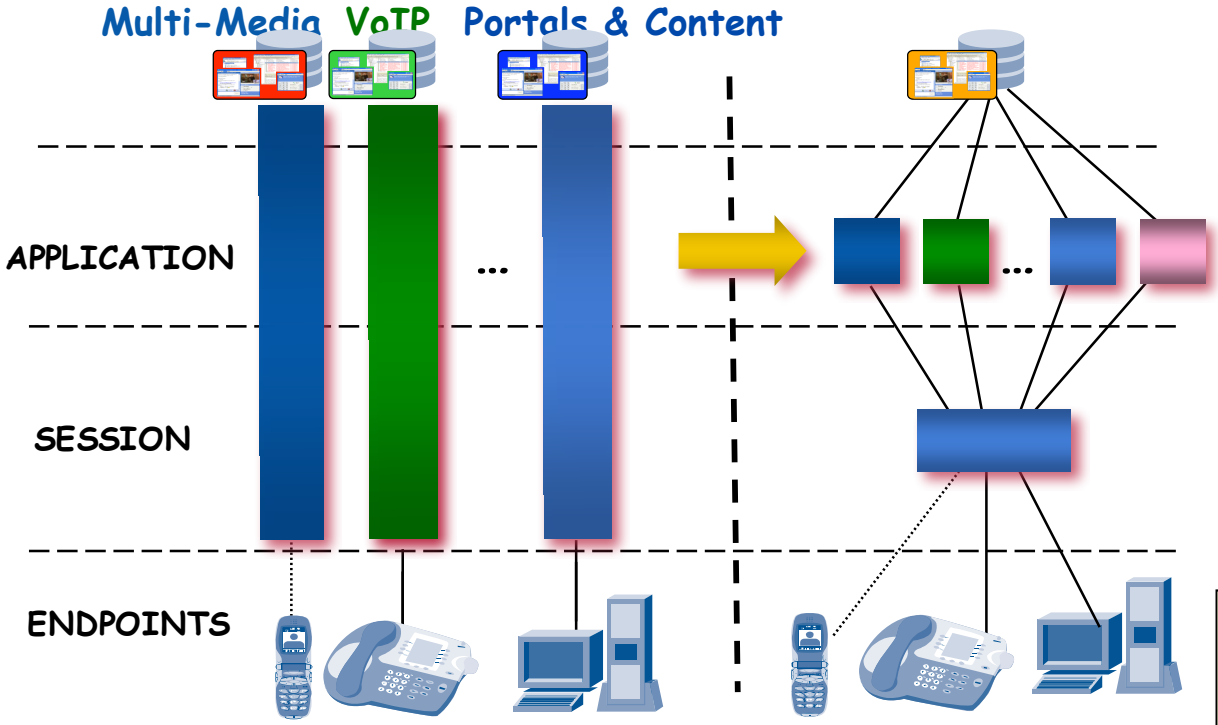
From Multiple Service Networks To Single Network / Multi access architecture

Invest in the Application Once!



Common Back Office Resources

Simplified Converged Applications
- Utilize existing and newly developed applications

Common Session Control
- Policy Management
- Privacy and personalization
- Single sign-on
- Sharing of common data across applications

Access Agnostic
- Downloadable SIP client
- Seamless mobility
- Common user experience

Converged services providers can build and launch services faster, efficiently adapting to market changes

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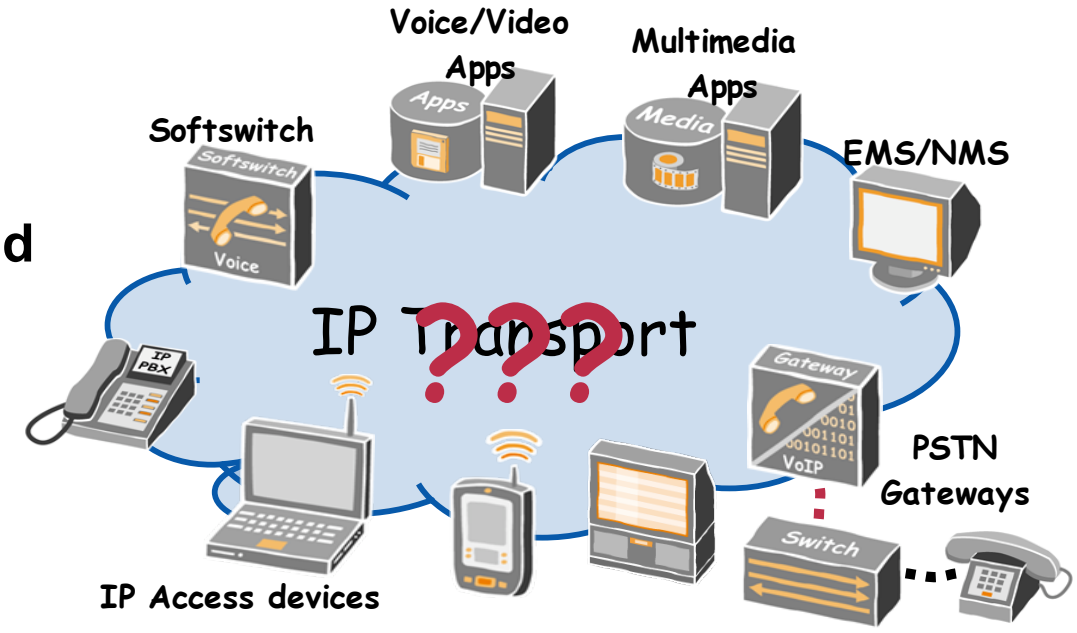
NGN/IMS Transport challenges

- **Connectivity**: VoIP & Multimedia equipment and protocols usually regard IP Transport as a “flat network cloud” (No NAT/FW/VPN’s)
- **Interoperability**: Multiple services, standards, providers
- **Guaranteed Quality of Service**
  - Currently "Best Effort“ or Statically provisioned
  - No Policy control & Resource reservation
  - Admission control
- **Security**
  - IP vulnerabilities



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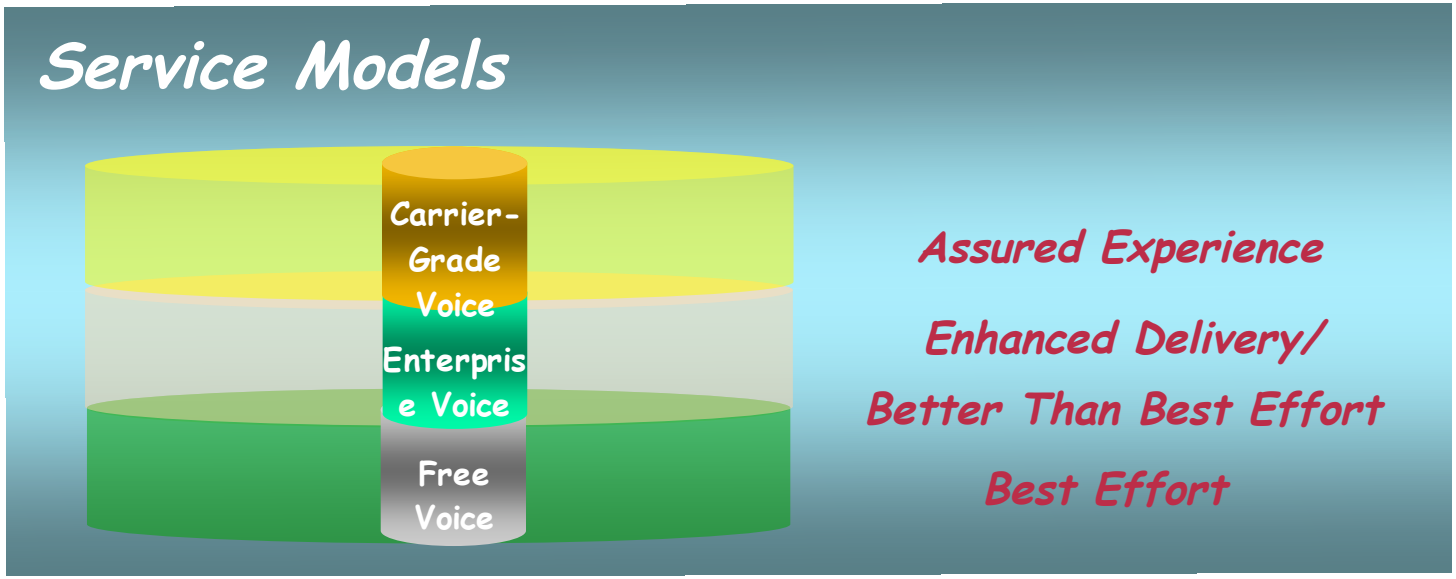
NGN/IMS Services challenges

- Different Services: Voice, TV, Multimedia, Internet, VPN …
- Different Levels of the same service: best effort, premium…
- Different AAA methods

All provided on the same network



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NGN/IMS security concerns

- Fraud
- Service Theft
- Attack on particular service
- Utilize subscriber base for unaccepted marketing purposes

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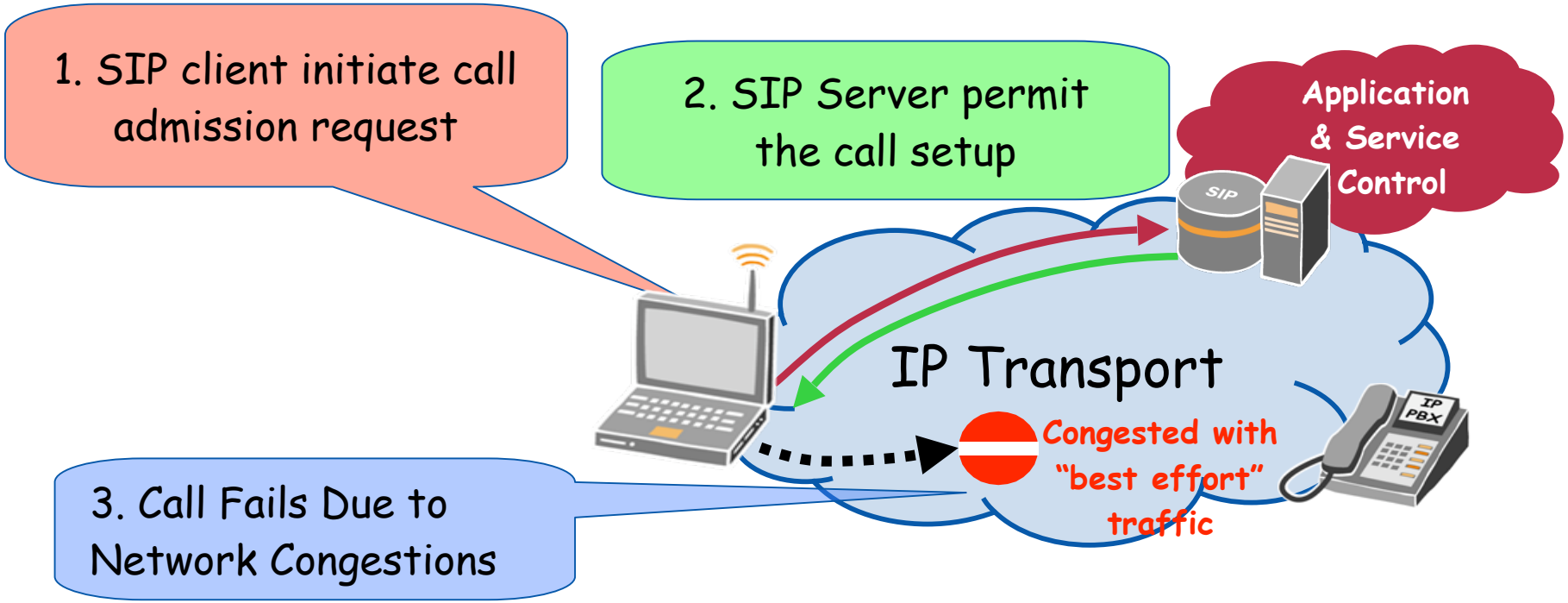
Example: QoS challenge for premium VoIP

- **The Application is not aware that transport resources are not available – call fails!**



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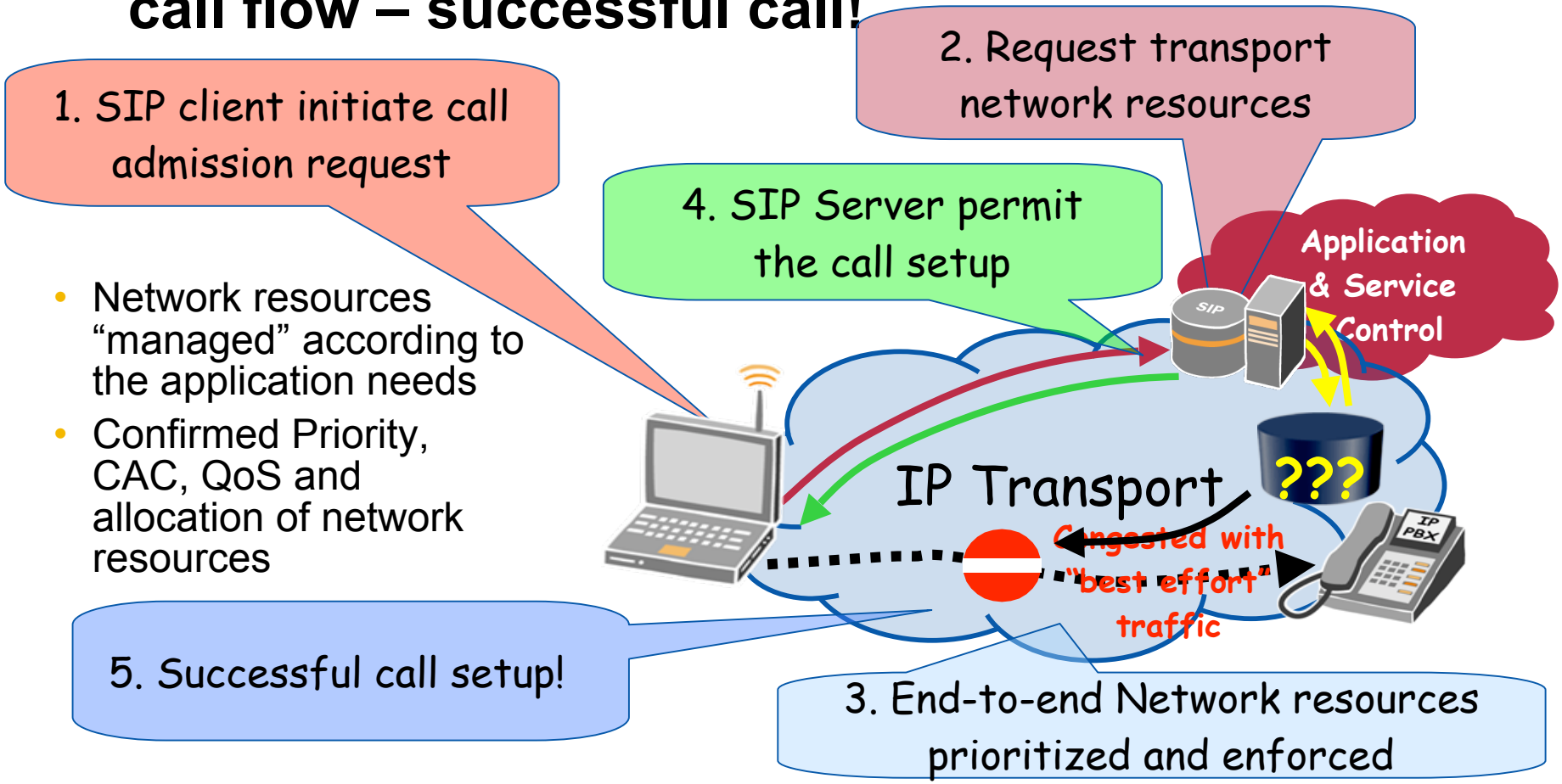
Example: QoS challenge for premium VoIP

- **Transport resources verified as part of the call flow – successful call!**



- Network resources "managed" according to the application needs
- Confirmed Priority, CAC, QoS and allocation of network resources

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- **NGN architecture**
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The need for customized policy control

From Best-Effort for a Small set of services

Apps & Services

No Linkage

Best-Effort Packet Handling

Ok for web surfing, but not multimedia or mission-critical services

To deterministic Quality for a large breadth of Unique Services

Apps & Services — OPEN

Policy & Control — OPEN

Secured & Assured Packet Handling — OPEN

Optimized for multimedia and mission-critical services

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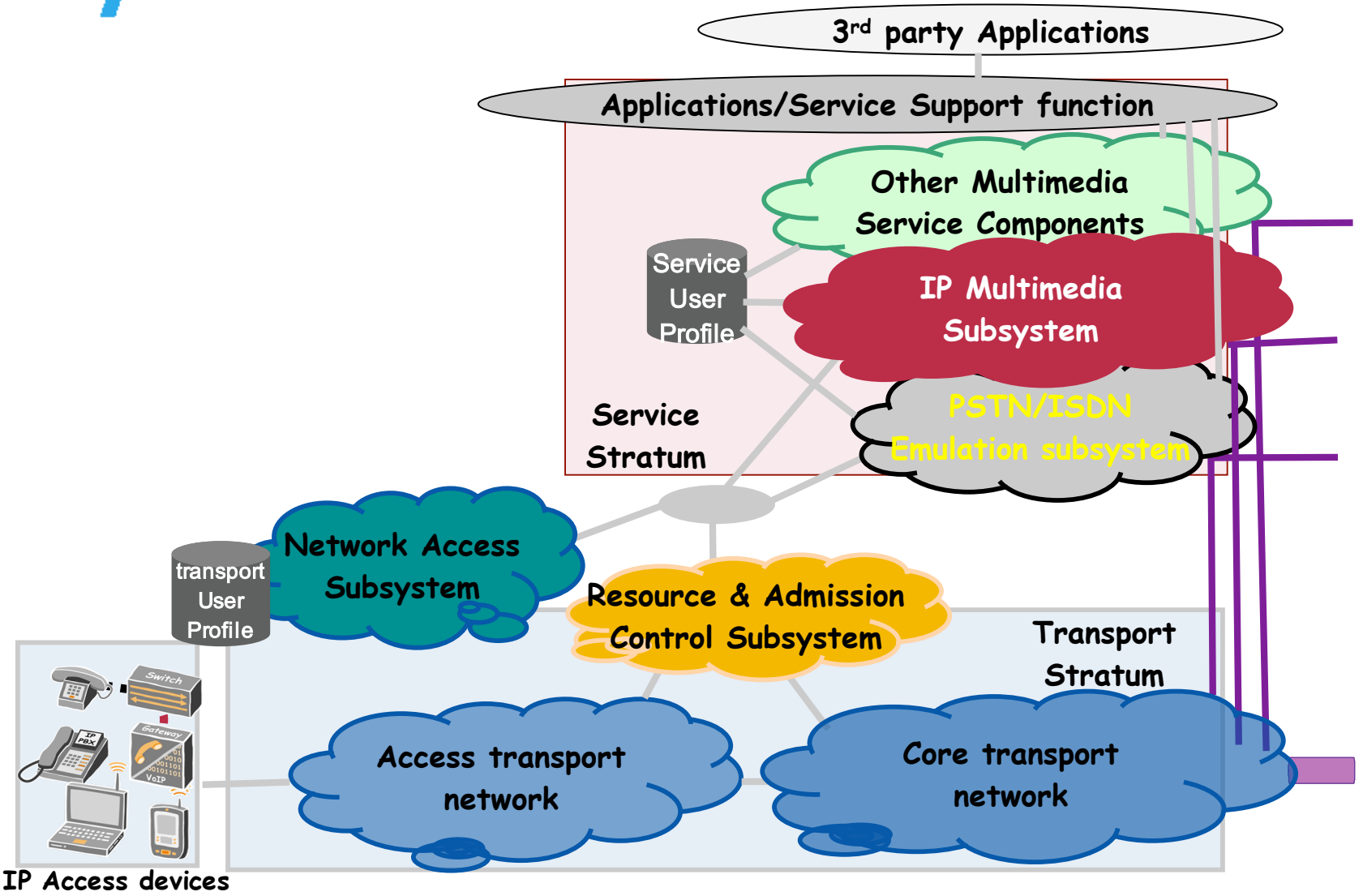
tispan Release 1 Architecture



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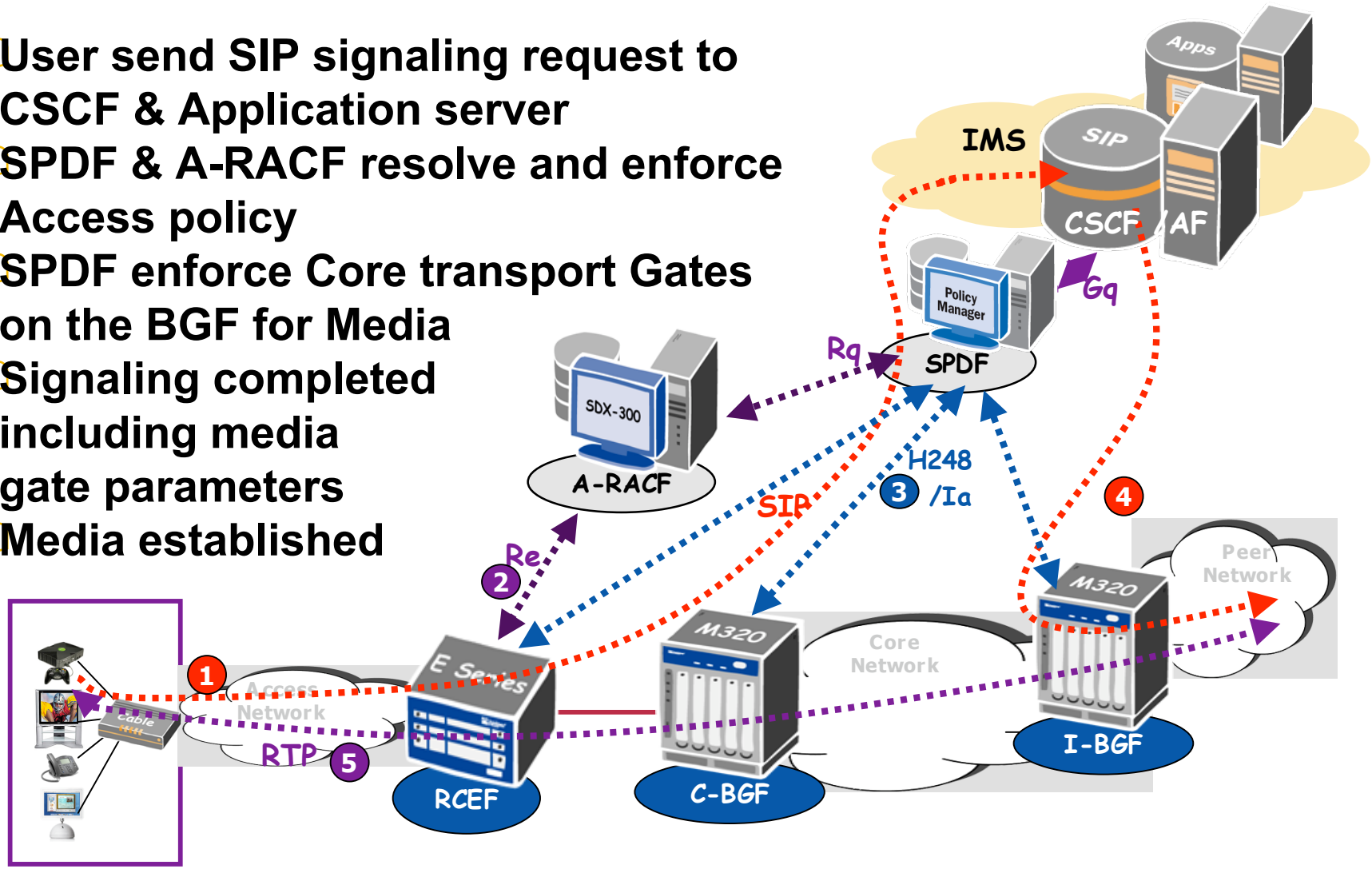
IMS Simplified call flow

- User send SIP signaling request to CSCF & Application server
- SPDF & A-RACF resolve and enforce Access policy
- SPDF enforce Core transport Gates on the BGF for Media
- Signaling completed including media gate parameters
- Media established



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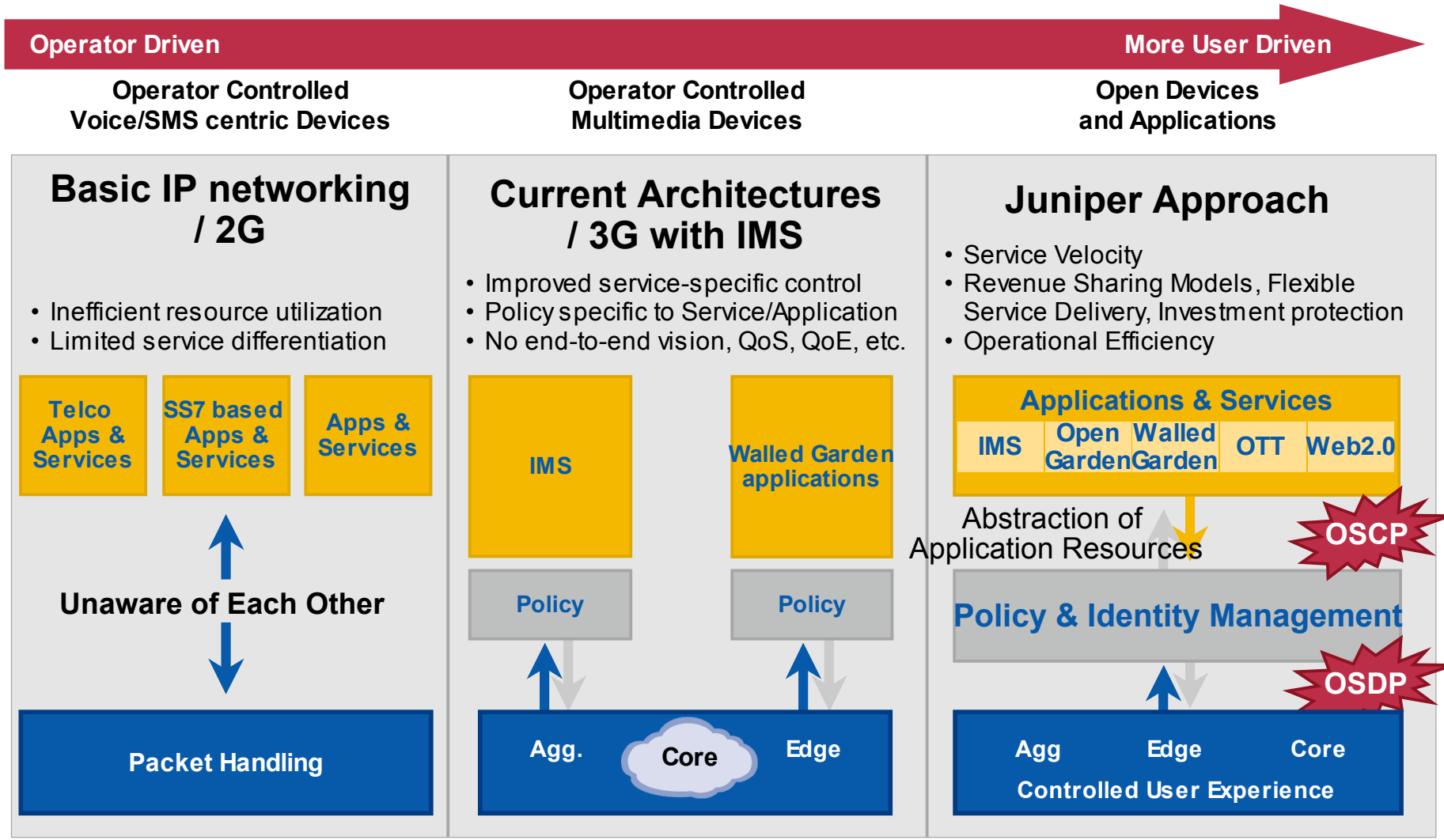
Strategic role of Policy and Identity



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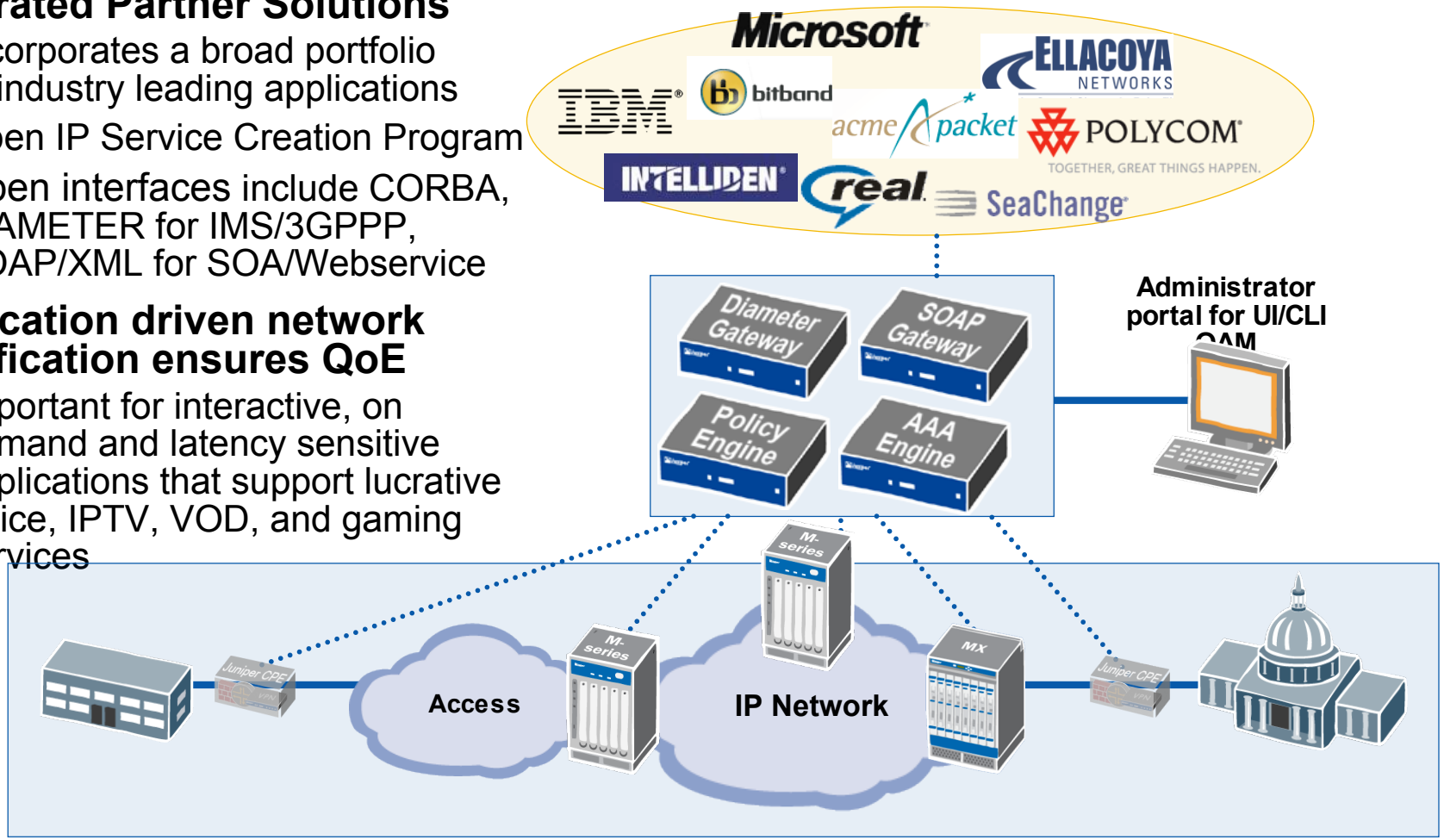
Application driven Network Control

- **Integrated Partner Solutions**
  - Incorporates a broad portfolio of industry leading applications
  - Open IP Service Creation Program
  - Open interfaces include CORBA, DIAMETER for IMS/3GPPP, SOAP/XML for SOA/Webservice
- **Application driven network modification ensures QoE**
  - Important for interactive, on demand and latency sensitive applications that support lucrative Voice, IPTV, VOD, and gaming services



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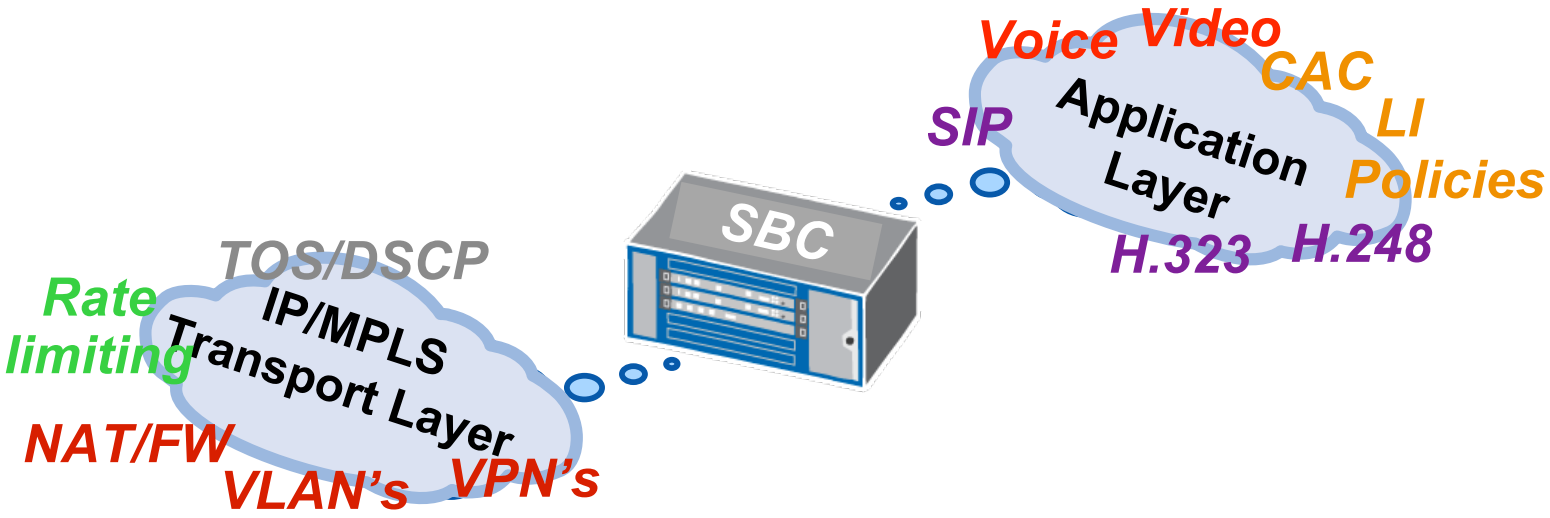
What is an SBC?

- **link between the application and the transport**
  - ***Session Border Controller is a session aware device (VoIP protocols & applications), that solves IP transport issues such as connectivity, security and QoS.***



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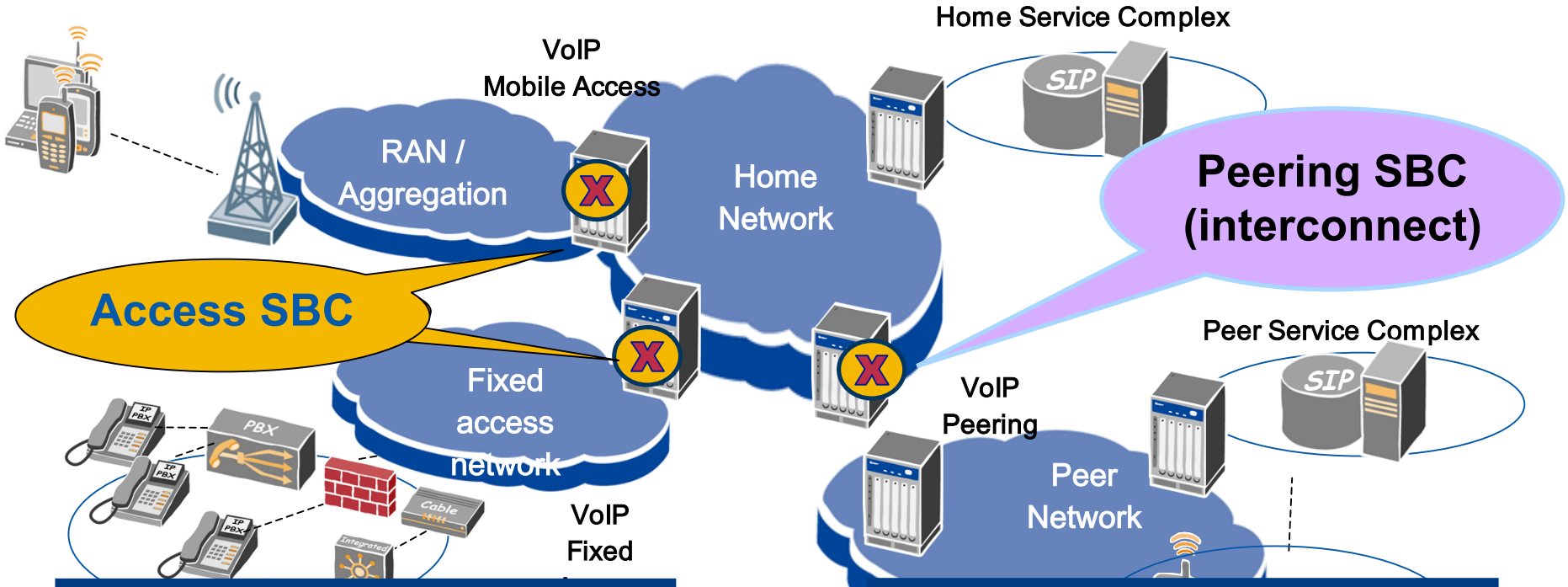
Session Border Control Locations



Access SBC: Located at the access edge of network facing the subscribers, securing and controlling their access to the network.

Peering SBC: Located at the peering edge interconnecting with other carrier network, controlling the exchanged traffic between them.

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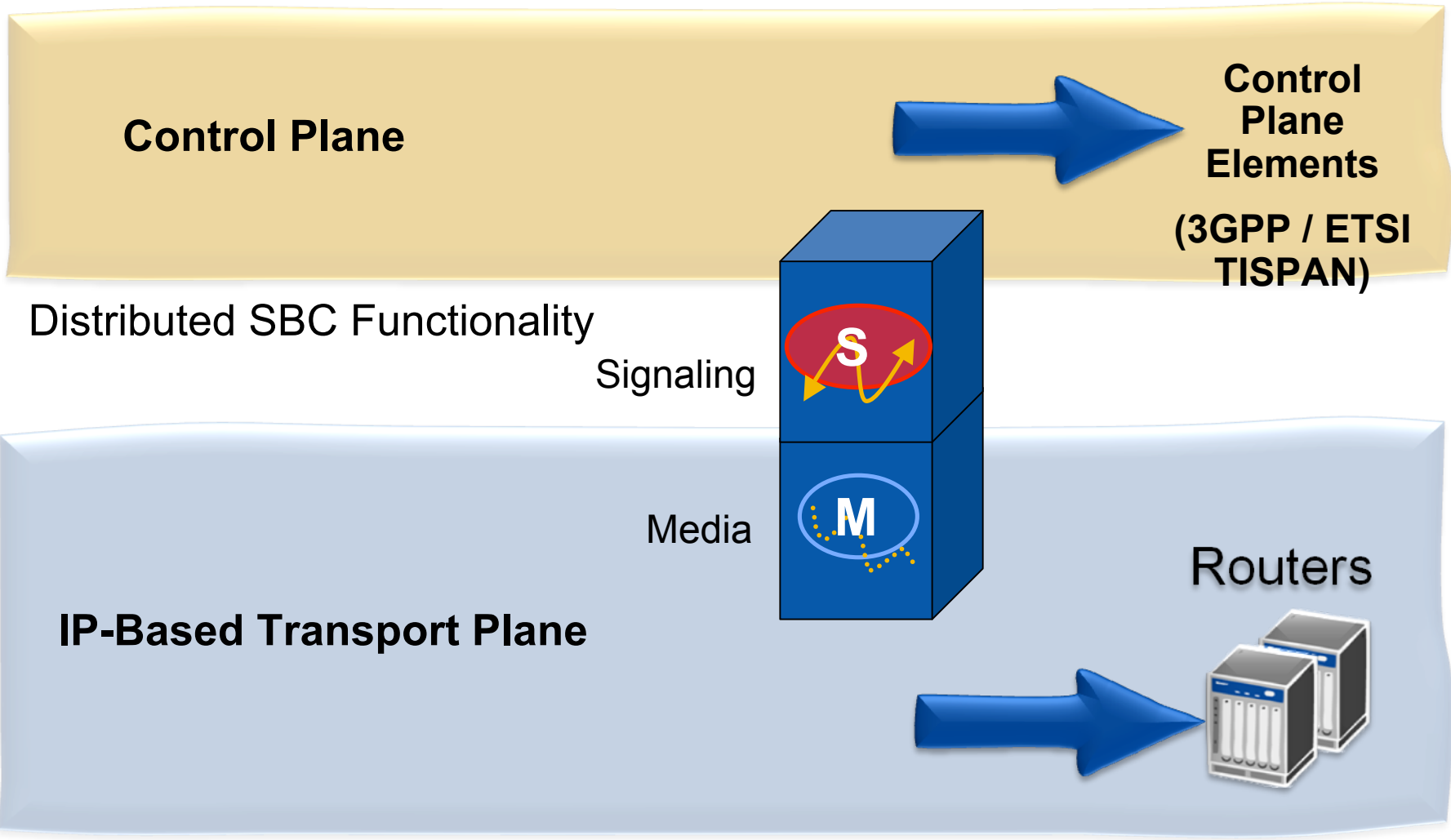
SBC Distribution trend



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Conclusions

- IP becomes the common transport for all applications and services
- Policy Management is Hot
- IMS/NGN architectures offer natural evolution and convergence path of fixed and mobile packet-based architectures
- *SIP* chosen as main protocol for multimedia services
- Vendors and carriers are moving from a *Softswitch Architecture* to the *IMS* architecture introduced by *3GPP* and adopted by *ETSI TISPAN.*
- Evolutions steps will require both *IMS* and *Non-IMS* support in parallel in the near future

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Thank you..!

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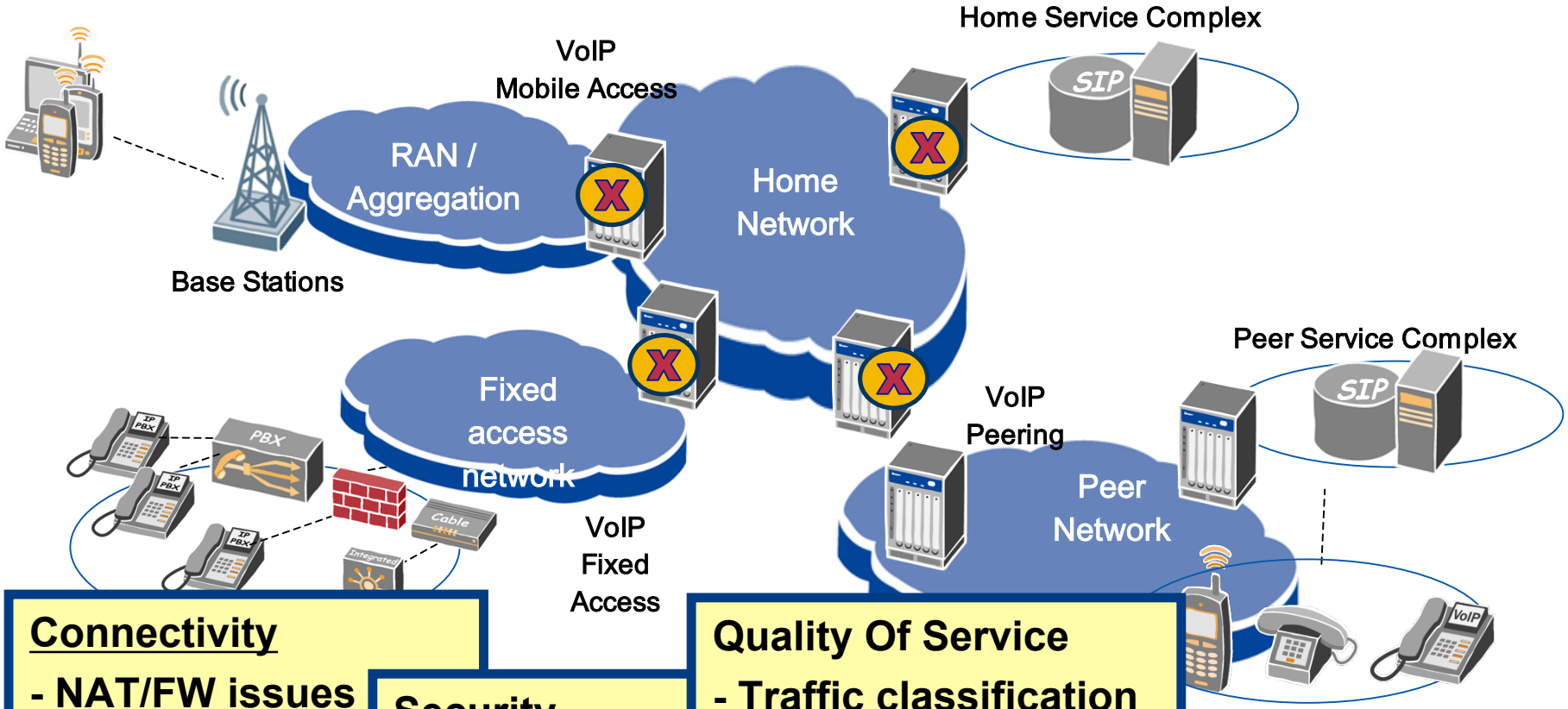
Session Border Control issues



Connectivity
- NAT/FW issues
- VPN & VLAN mapping
- IPv4 / IPv6

Security
- DoS attacks
- Service theft
- Fraud

Quality Of Service
- Traffic classification
- Service Levels
- Reporting

Regulatory Compliance
- E911
- Lawful interception

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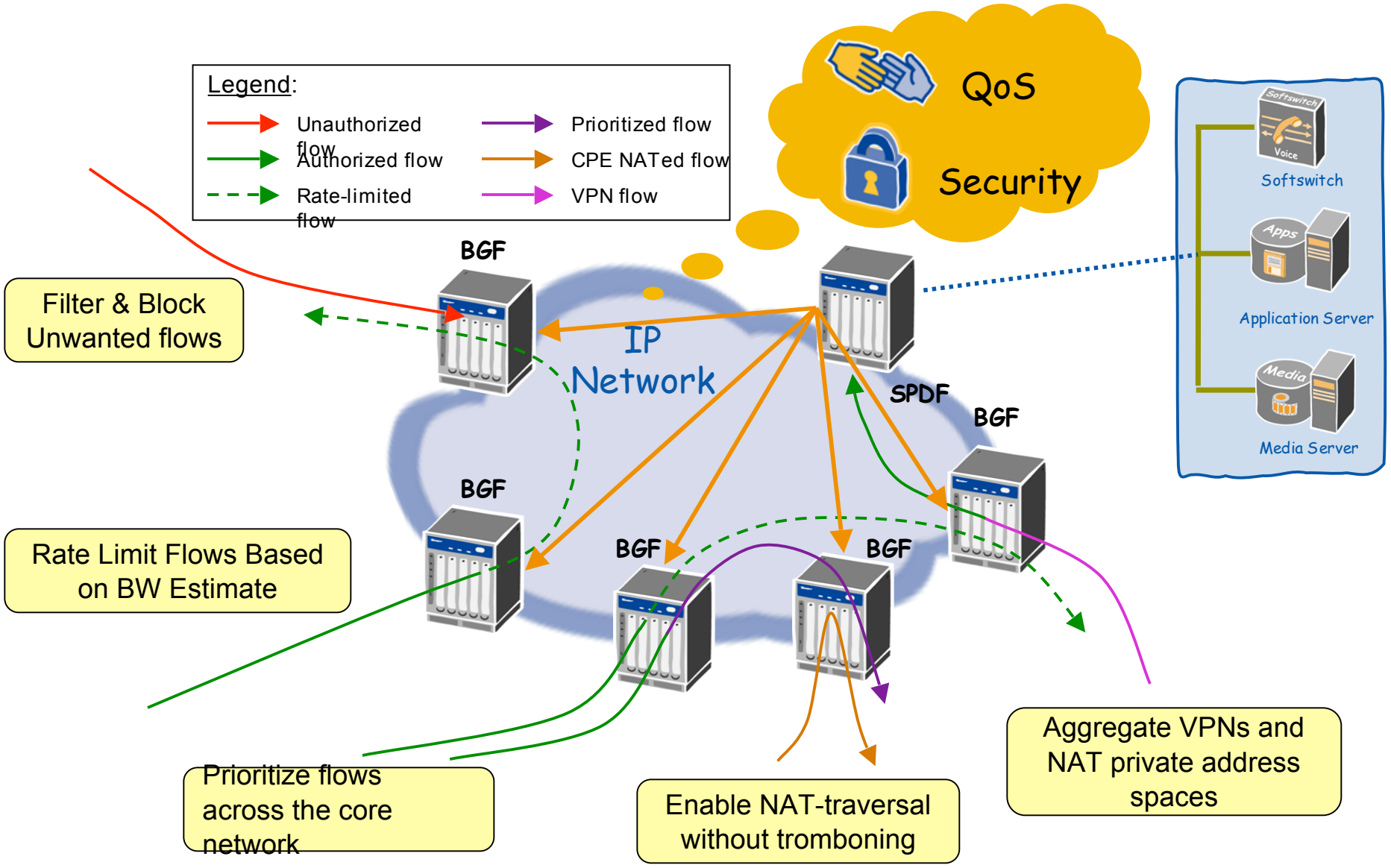
Architectural Motivation for BGF Distributing



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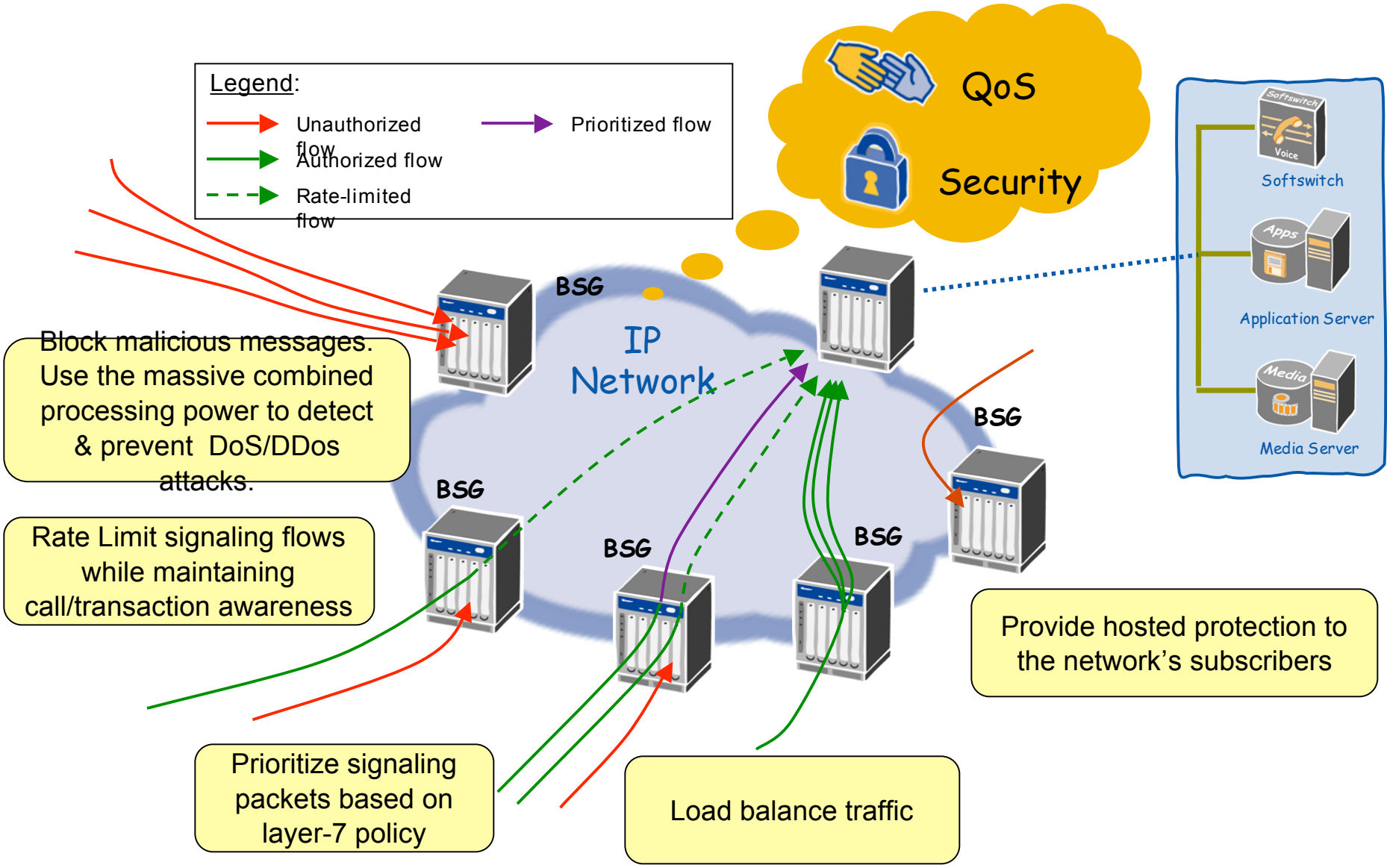
Architectural Motivation for BSG Distribution



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NGN - Convergence Network

- Dedicated network per service
- Multiple services/Edge over a common core
- Multi-service edge over a common core
- Multi-service (Core +Edge combined) platforms

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