

Upgrade mobile packet cores now

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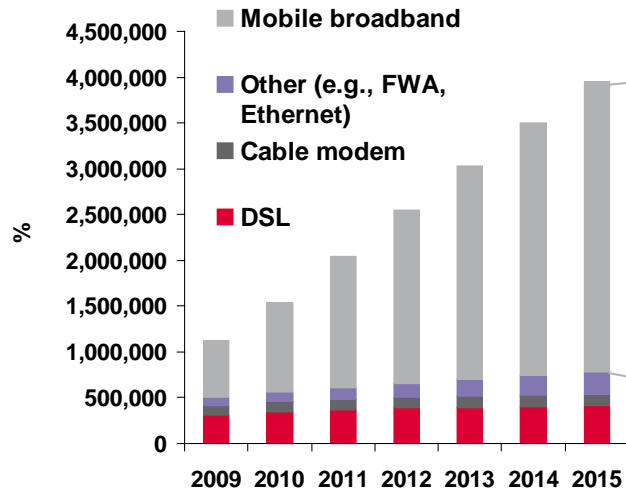
SP IP Infrastructure

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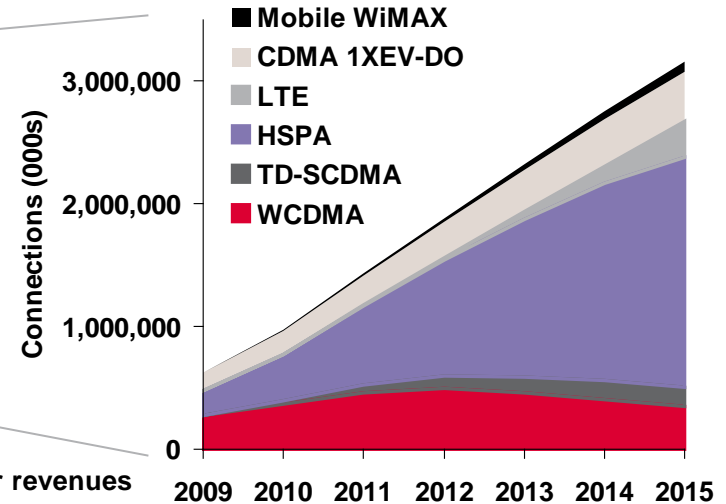


Fixed and mobile broadband subs/connections growth is strong, but SPs revenues lag

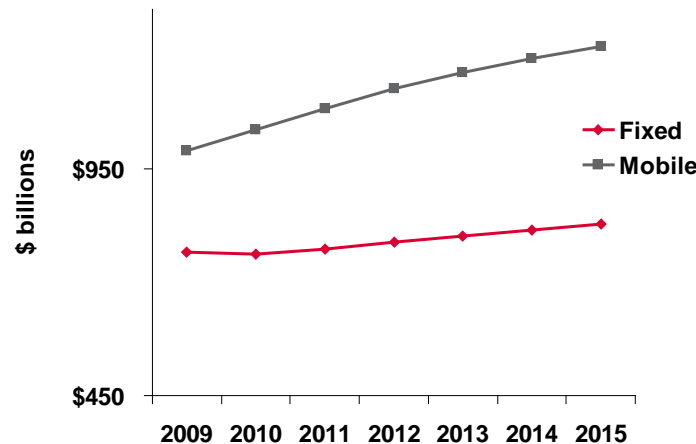
Broadband subscribers



Mobile broadband connections by technology



Global service provider revenues



Source: Ovum

CAGRs (2009-15):

Mobile BB conn's:	31%
Fixed BB subs:	8%
Mobile revenues:	4%
Fixed revenues:	1%

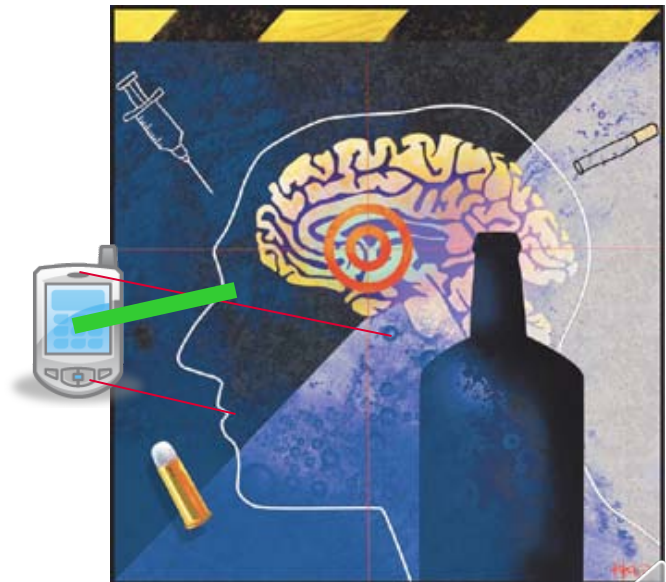
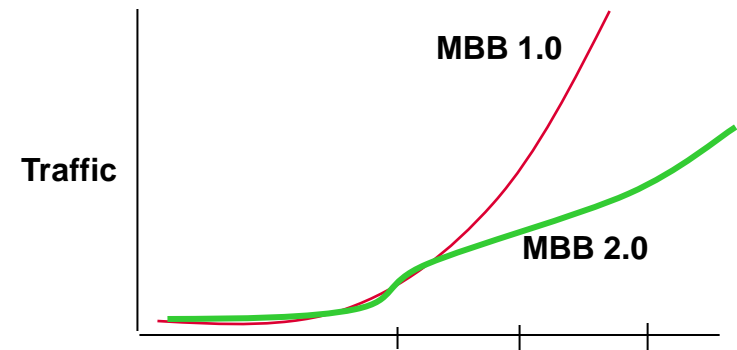
Source: Ovum.

FWA is fixed wireless access



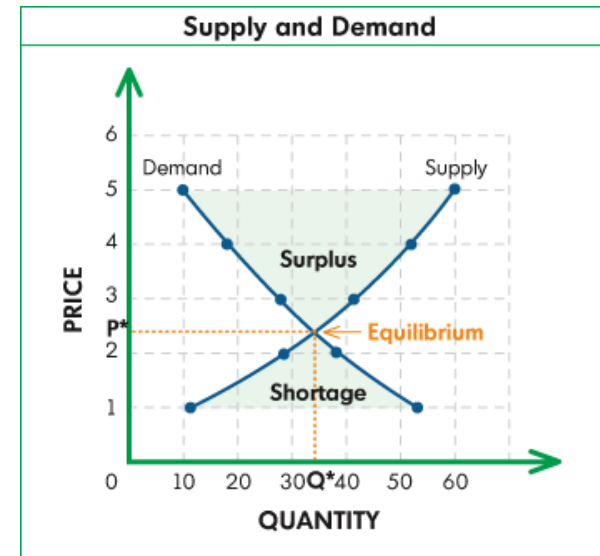
Mobile BB 1.0: out of control, unsustainable growth

- Mobile broadband forecasts are unsustainable - period.
- A new mobile broadband service architecture and business model is emerging – MBB 2.0.
- After some adoption delay, MBB 1.0 proved in demand for mobile data connectivity, apps and devices; also ‘addicted’ consumers.
- Policy management and bandwidth optimization will lead to more sustainable MBB infrastructure and revenues.



Mobile broadband economics- not your everyday supply and demand curve

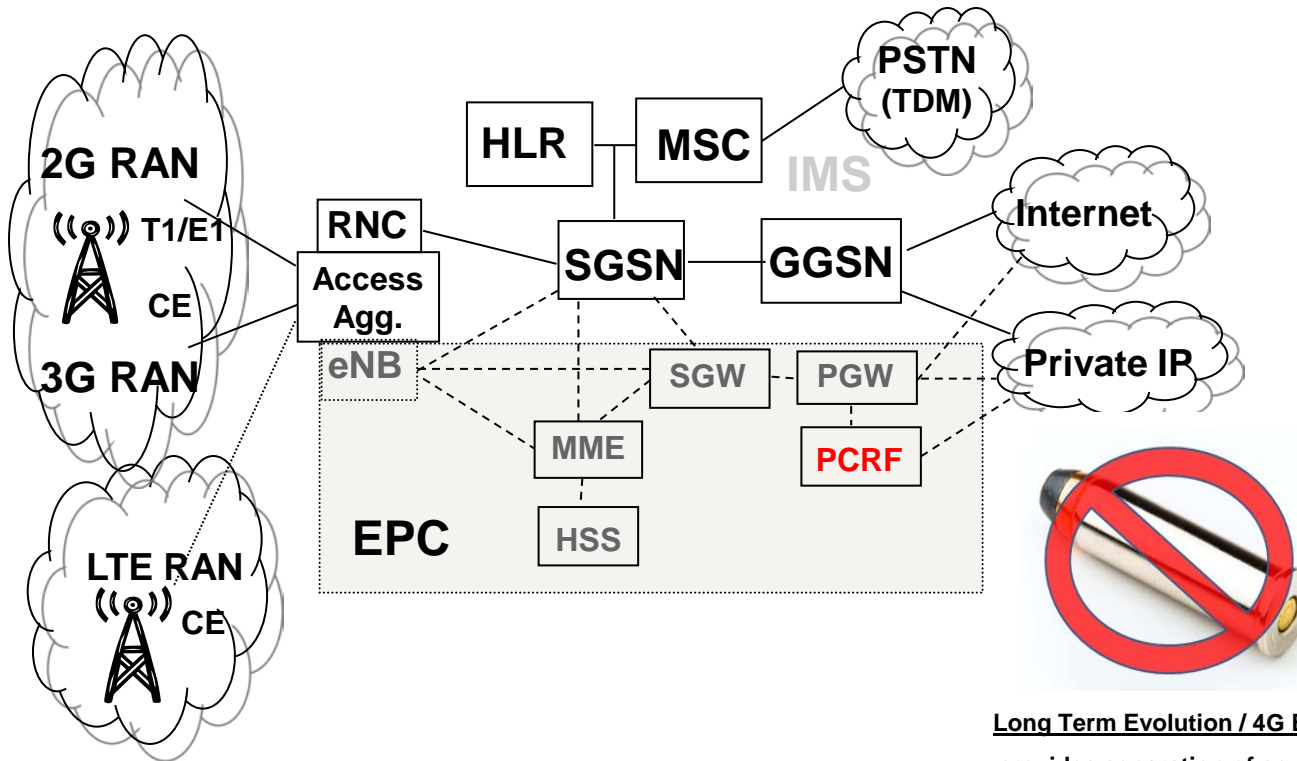
- MBB demand is accelerating (at a constant price)
 - Both number of and utilization per customer
 - Smartphone and App uptake prime drivers
- MBB pricing can be modified but expanded billing solutions needed and pricing must be competitive.
 - Institute Fair Use (EULA), Policy rules and enforcement
 - Offer QoS based service tiers
- MBB supply is limited but can be 'enhanced'
 - Improving system utilization and leveraging billing options
 - Adding capacity via 3G HSPA+ and 4G LTE Advanced
- Equilibrium point can be manipulated to improve profitability
- '2 Sided' business model adds another dimension
 - Ad or employer sponsored services
 - Usage sensitive apps



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3GPP's EPC the functional target, but not a 'silver bullet'



Per-session activity:

OSI MODEL		UPPER LAYERS
7	Application Layer Type of communication: E-mail, file transfer, client/server.	
6	Presentation Layer Encryption, data conversion: ASCII to EBCDIC, BCD to binary, etc.	
5	Session Layer Starts, stops session. Maintains order.	
4	Transport Layer Ensures delivery of entire file or message.	
3	Network Layer Routes data to different LANs and WANs based on network address.	
2	Data Link (MAC) Layer Transmits packets from node to node based on station address.	
1	Physical Layer Electrical signals and cabling.	LOWER LAYERS

Long Term Evolution / 4G Evolved Packet Core (EPC) for All-IP

-provides separation of control plane from bearer plane

eNB – part of RAN, hosts Physical, MAC, Radio Link Control and Packet Data Control protocol

SGW- serving gateway user data routing/forwarding

PGW – packet gateway to external IP networks

MME- mobility management entity server

HSS – home subscriber server

PCRF- policy, charging rules function controller

2G, 3G General Packet Radio Service (GPRS) for IP data

-supports IP session management, mobility management, billing and lawful intercept

RNC – Radio Network Controller – part of RAN

SGSN –Serving GPRS Support Node –mobility management, billing

GGSN – Gateway GPRS Support Node – to IP networks

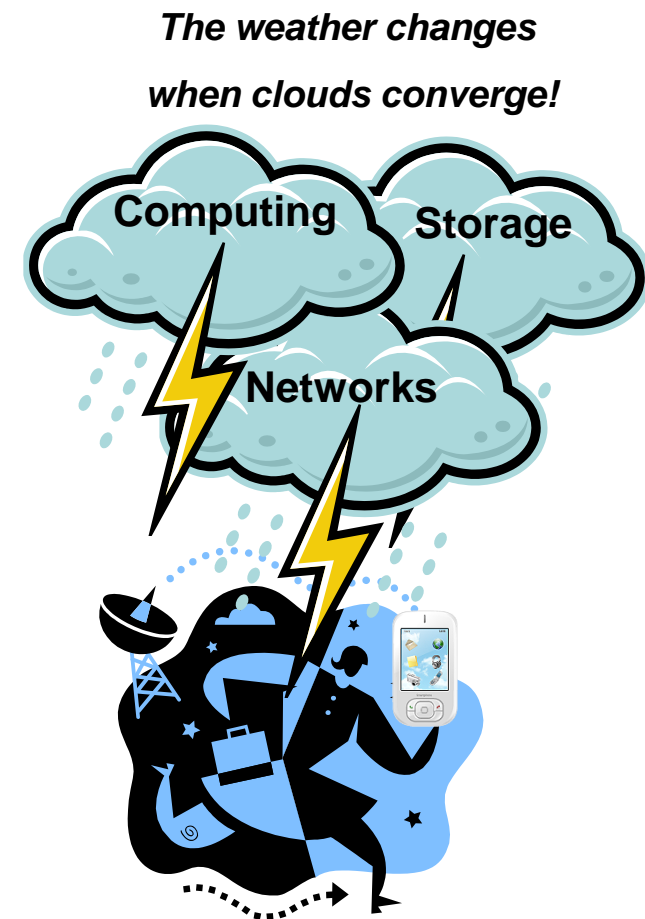
HLR – Home Location Register- database of subscribers

MSC – Mobile Switching Center – TDM voice switch



SP IP and Ethernet open the flood gates to Carrier Class client-server based services and applications

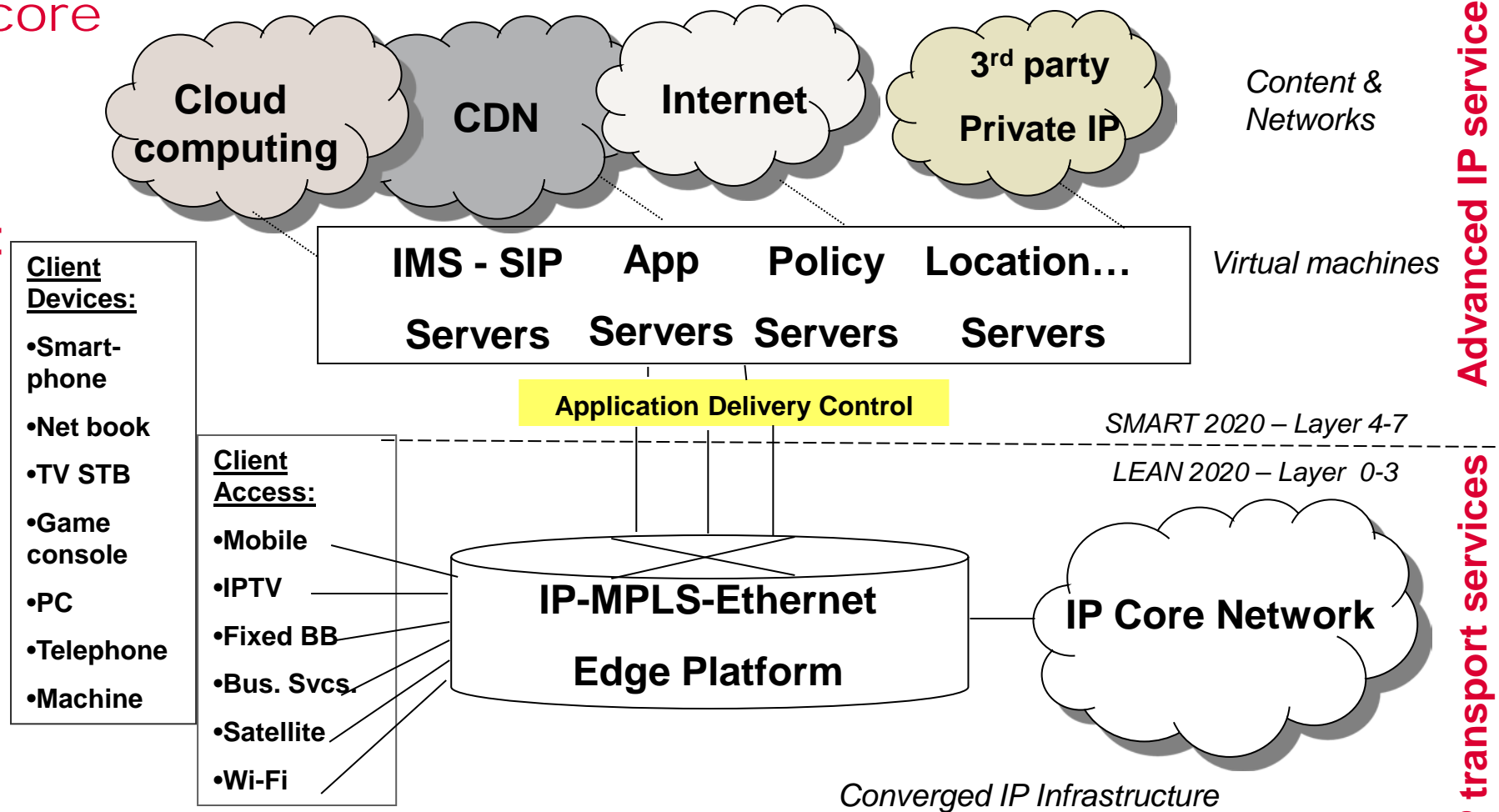
- Carrier class client server computing = SP Cloud
- ATIS SON Forum, (Service Oriented Networks) developing 'service enablers' for SPs to deploy NG services and applications building on Web 2.0 (SOA), Telco 2.0, IMS and SOA IT oriented solutions
- Enterprise Open Data Center Alliance and Intel's Cloud 2015 will impact Telecoms services and network layer
- Common themes:
 - Abstraction, virtualization and re-use
 - Identity management
 - Policy management
 - 3rd party APIs and avoidance of silo'd or proprietary solutions



IP services network 2012-2015: Converged fixed-mobile core

Billable Apps

Advanced IP services



IP transport services

SMART=Services, Management, Applications, Relationships Technology

LEAN=Low cost Enablers of Agnostic Networks



App framework - adoption of IP allows mobile networking solutions to incorporate Enterprise resource contention solutions – Application Delivery Controllers

- Like Mobile, Enterprises have available bandwidth constraints
- Enterprise IT is based on Client-Server computing models to support a wide variety of geographically dispersed business applications; managed IP mobile devices are 'clients' of the mobile network 'server'.
- 'Chatty' (signaling intensive) Enterprise application performance is much improved with application delivery controllers and WAN bandwidth optimization 'appliances'.
- Data center server virtualization (also made possible by IP adoption) decouples applications from single silo servers, improving server load balancing and utilization.
- Enterprise high availability systems become carrier-class and evolve billing capabilities

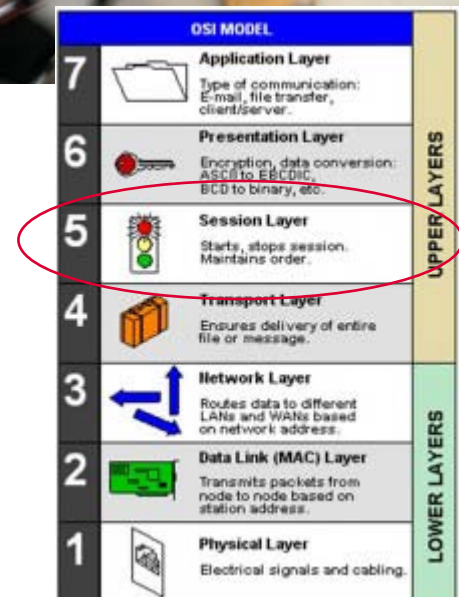


Controller



Application delivery orchestrates IP network, servers and storage for well performing apps

- Servers, storage and routers must be coordinated to deliver applications...and thousands of 'concerts' at a time!
- Control systems, signaling, and awareness of subscribers, services and network conditions form the nervous system for MBB 2.0
- Delays won't be tolerated!!!
- 'Service delivery networking' adds billing capability



MBB 2.0: do more with what you got

- Its not how much bandwidth you have but what you do with what you have
 - Throttle it, meter it, ration it...optimize it!
- Control your bandwidth junkies- don't let them control you
 - Institute Fair Use and policy controls
- Quality of Experience drives app willingness to pay
 - Poorly performing apps demand refunds
- Make the most of mobile broadband success by making premium lemonade
 - Profit from the good fortune of mobile broadband demand!



Thank you

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