

IPv6 adoption for operators

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Coverage

Drivers for IPv6

New service opportunities

Present IPv4 Eco system

Design consideration

Translation strategies – options available

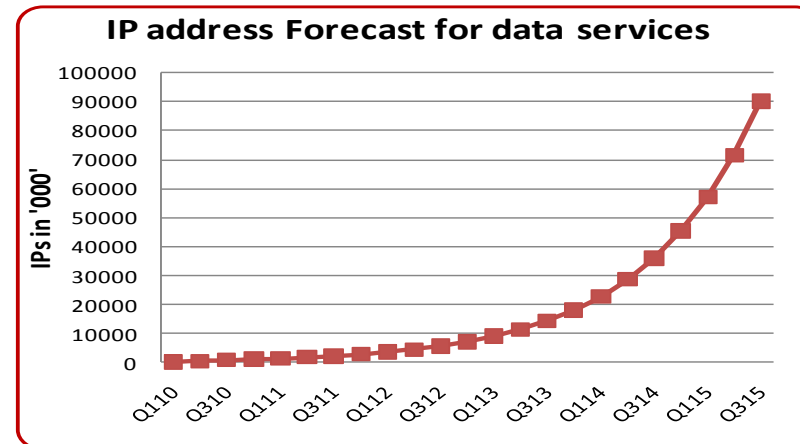
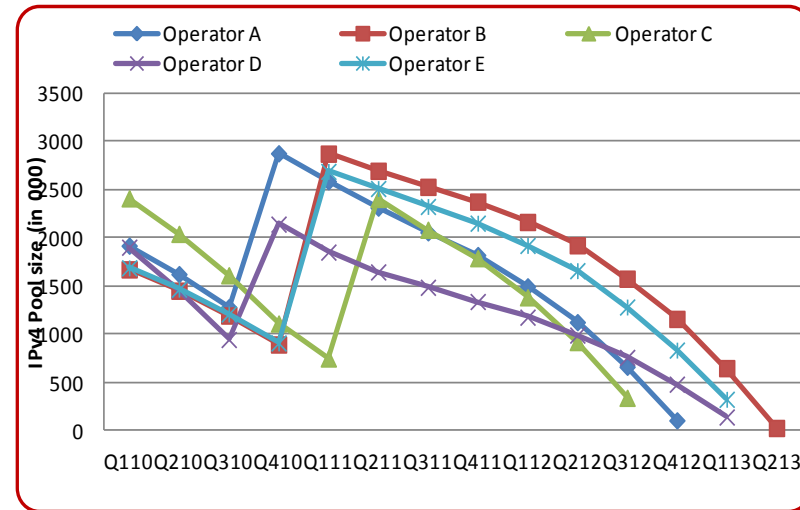
Challenges in IPv6 transition

Airtel status and support to Industry

Summary

IPv6 adoption Drivers

- Limited IPv4 address space depletion (0.03 IPv4 per person)
- Internet user growth
 - 3rd largest user base (India 112Mn, China 300Mn & US 207Mn)
 - 89 times Mobile sector growth (10Mn in 2002 to 890Mn in 2011)
- Demand for IPv6 by Business customers
- National IPv6 strategy
- New service opportunities



Exploding mobile broadband traffic

You **Tube**

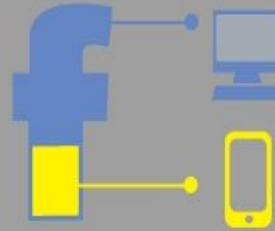
200 Million⁺

YouTube views occur on mobile devices per day

6 Million GB

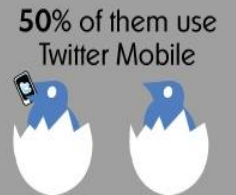
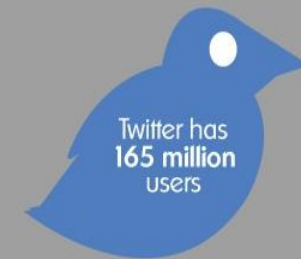
facebook

Over 1/3
of Facebook's
600 million+
user base uses
Facebook
Mobile



1.5 Million Users

twitter



**75 Million
Messages**

Source: "Tech Orange" web site, March 2011

New services opportunities - across verticals



Communication

- Service providers
- Data centers
- ASP/Web Host



Energy

- Smart Grid
- Smart Meters



Transportation

- Intelligent transportation
- Smart vehicles



Healthcare

- Emergency rural healthcare
- Smart healthcare management systems



Government

- Regulatory agencies
- Domain Registrar's
- Internet Exchange
- Government agencies



Disaster Mgmt

- * Disaster surveillance system
- * Disaster response system

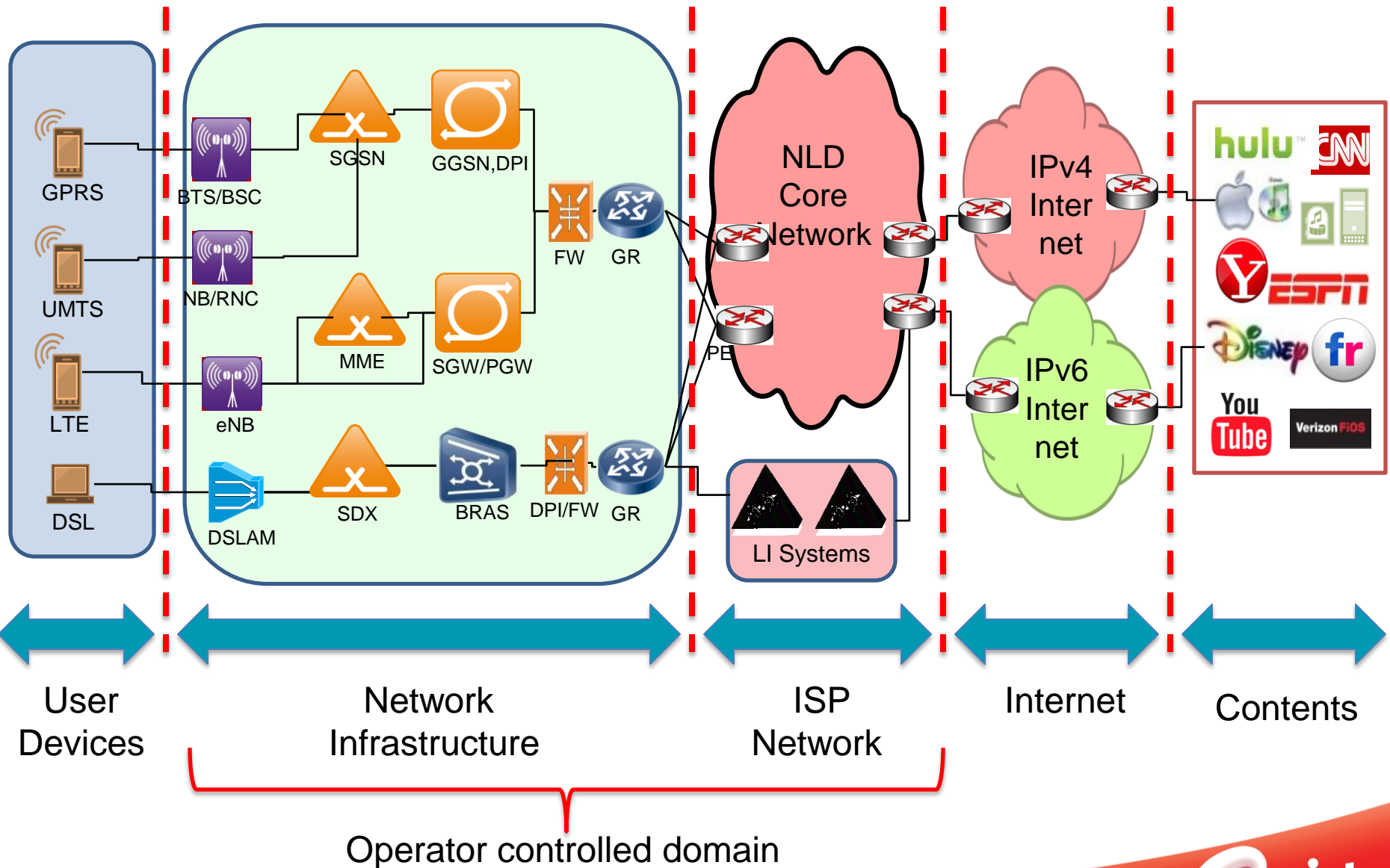


Banking and finance

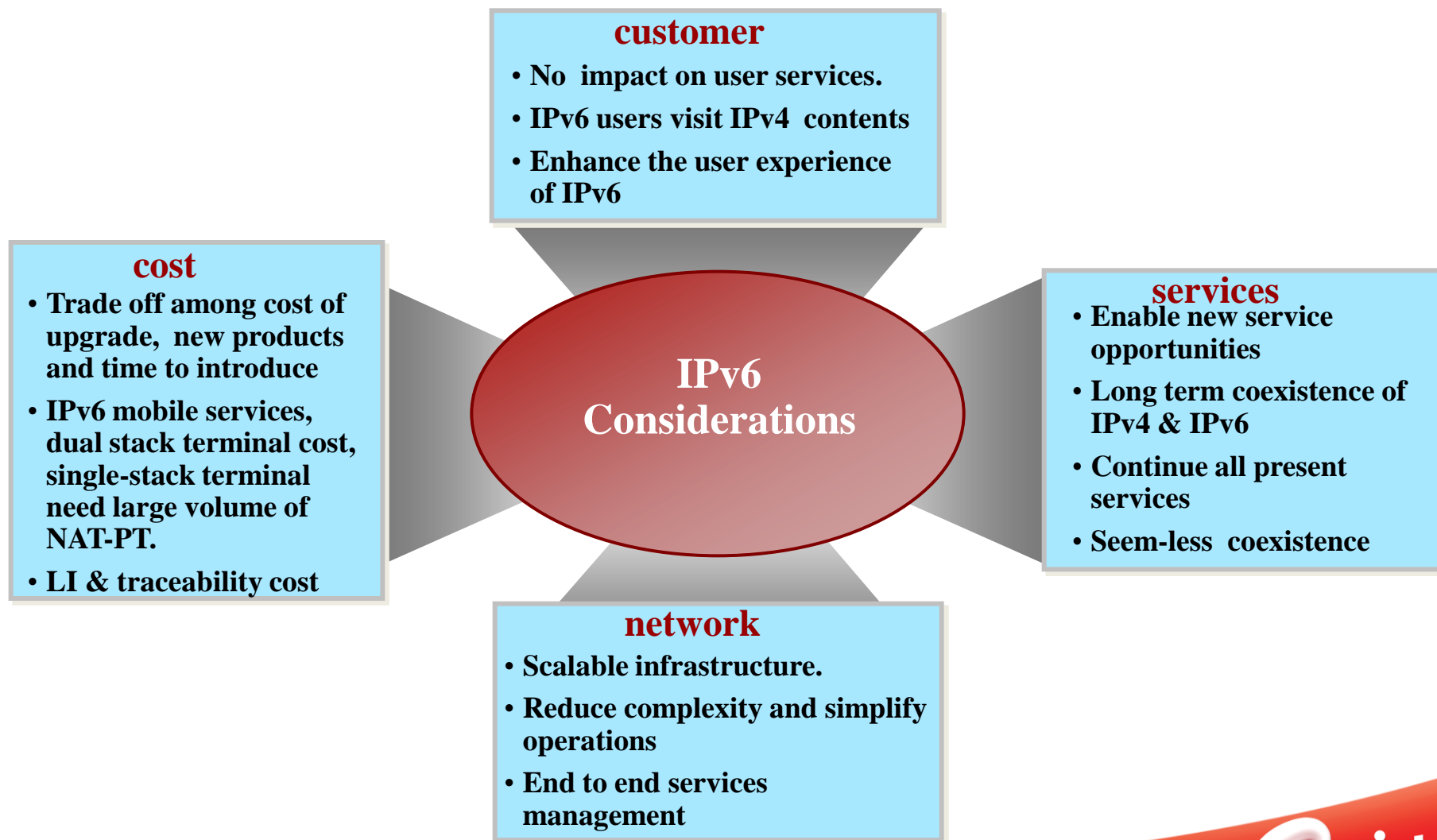
- Payment gateways for e-commerce
- Internet banking and e-broking services

IPv6 across verticals

Present IPv4 eco system



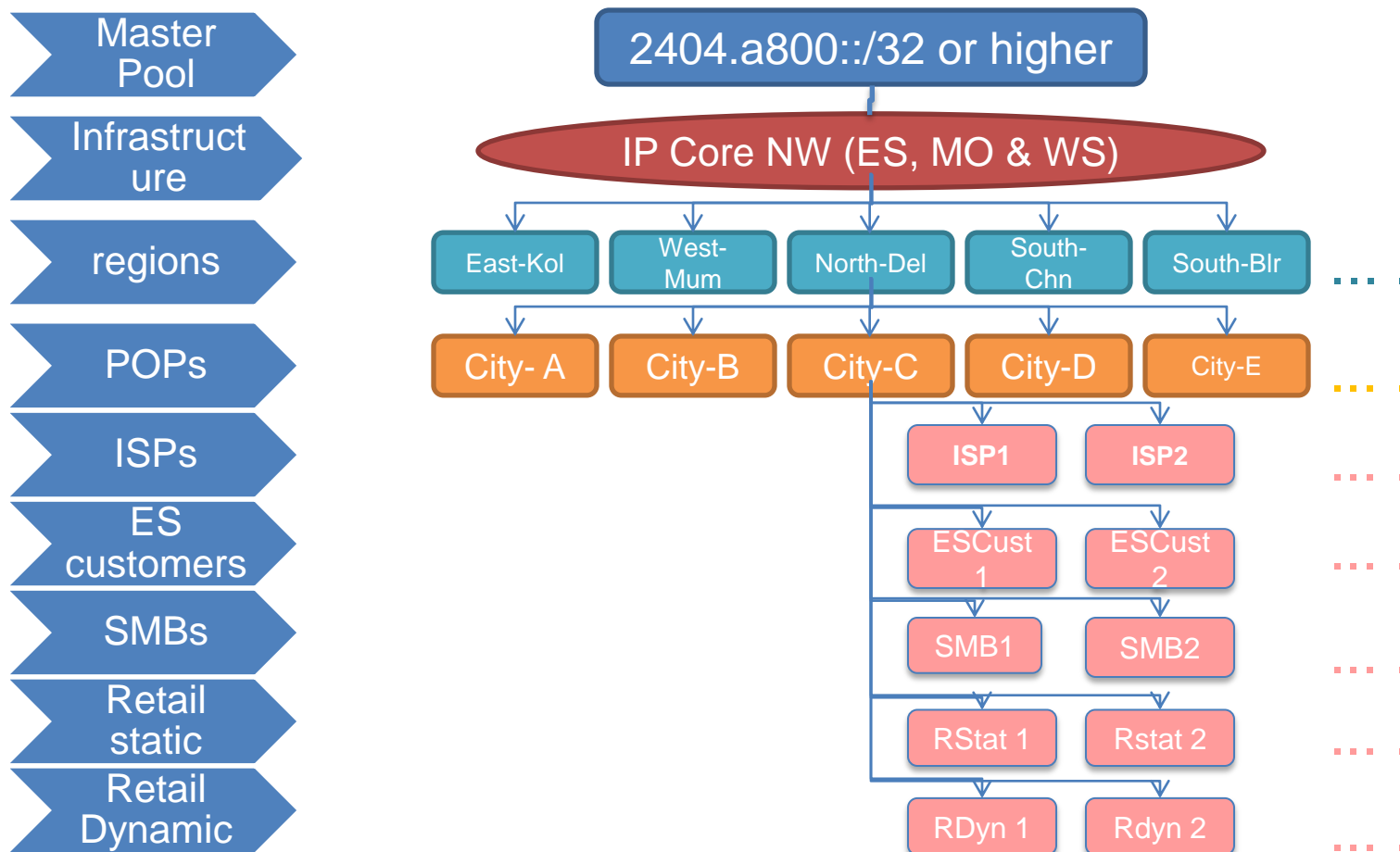
Business considerations



IPv6 Design considerations

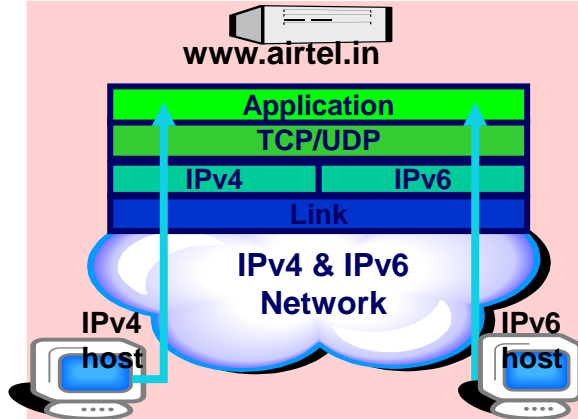
Parameters	Consideration
IPv6 Addressing Plan	<ul style="list-style-type: none">• IPv6 requirement for 10+ years and assignment policy.• Assignment for retail users, Business customers and infrastructure.
Selection of Transition strategies	<ul style="list-style-type: none">• Strategy for retail services• Strategy for Business services
IPv6 Interconnection	<ul style="list-style-type: none">• Peering with upstream, NAP/NIXI, private peering.
User Plane & Transport Plane choices	<ul style="list-style-type: none">• Start with user plane• Different options for control plane• Use of existing management where ever possible
OSS, BSS and Network Management	<ul style="list-style-type: none">• Select control plane option meeting service requirements.• Monitor and manage IPv4 and IPv6 traffic
LI & regulatory compliance	<ul style="list-style-type: none">• Solution for meeting regulatory requirement.
Scalability and reliability	<ul style="list-style-type: none">• Right technology choice to increase scalability of services.• More than carrier grade reliability.
SLA & KPIs	<ul style="list-style-type: none">• Network Architecture and services design to ensure better customer experience.
POC and product validation	<ul style="list-style-type: none">• Invest in setting up POC infrastructure for validation of overall solution

IPv6 allocation plan



Transition strategies

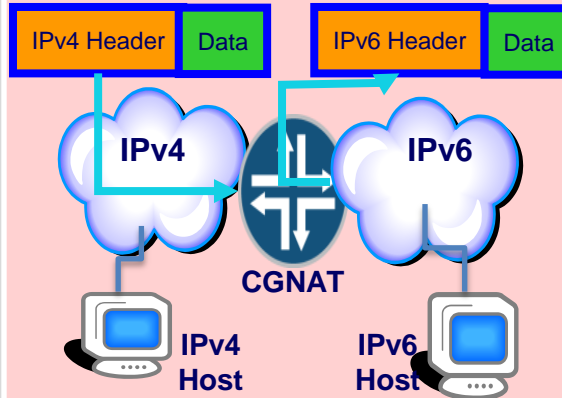
Dual-Stack



IPv6/IPv4 co-existence

- Best-suited for the Core
- Ideal inflection point in the network
- Flexible edge options
- Need DS capable CPEs
- Technologies for Core
 - DS routing protocols
 - 6PE
 - 6VPE

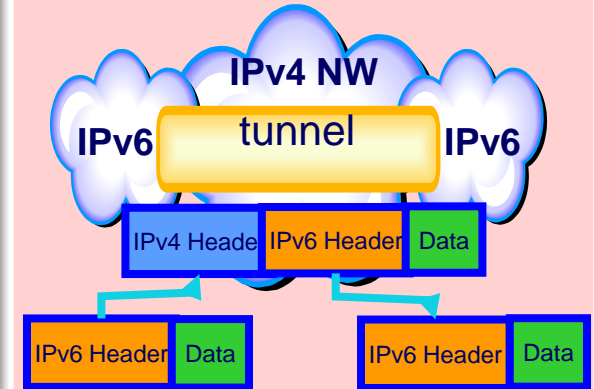
Translators



IPv6 ↔ IPv4 translation

- Solves the problem at the edge
- Expected to co-exist with Dual-stack for some time
- Technologies
 - NAT44/NAT444
 - NAT64
 - DS Lite
 - DS Lite + A+ P

Tunnels



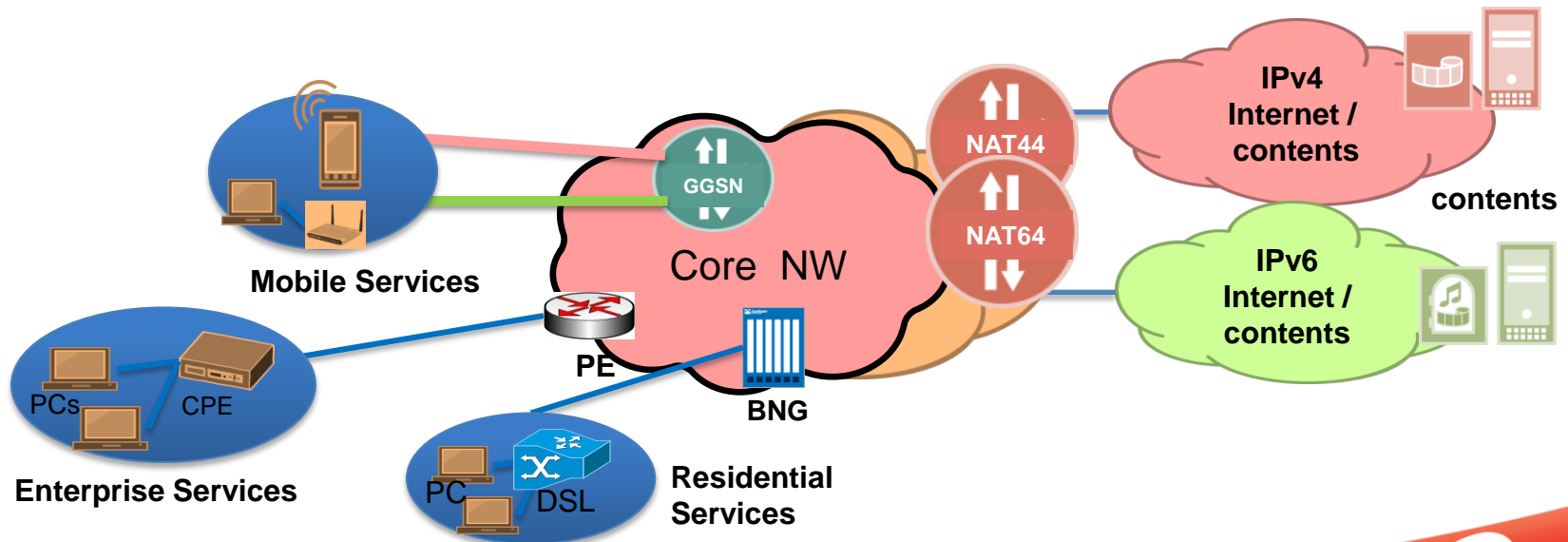
IPv6 Tunneler over IPv4

- Ideal when Core is not v6 ready
- Requires v6 capable CPEs
- Technologies
 - 6 to 4
 - 6rd
 - ISATAP
 - Teredo

Translation requirement

3G Handsets Makes: 22 Handsets Models: 754	Top 60 models(83.4%)		All 754 models	
	Nos	%	Nos	%
IPv6 Supported	2,400,343	57.8%	2,400,343	48.2%
Not Supported	1,753,635	42.2%	1,753,635	35.2%
Unknown handsets	-	0.0%	829,292	16.6%
Total	4,153,978	100.0%	4,983,270	100.0%

None of the GPRS models support IPv6.

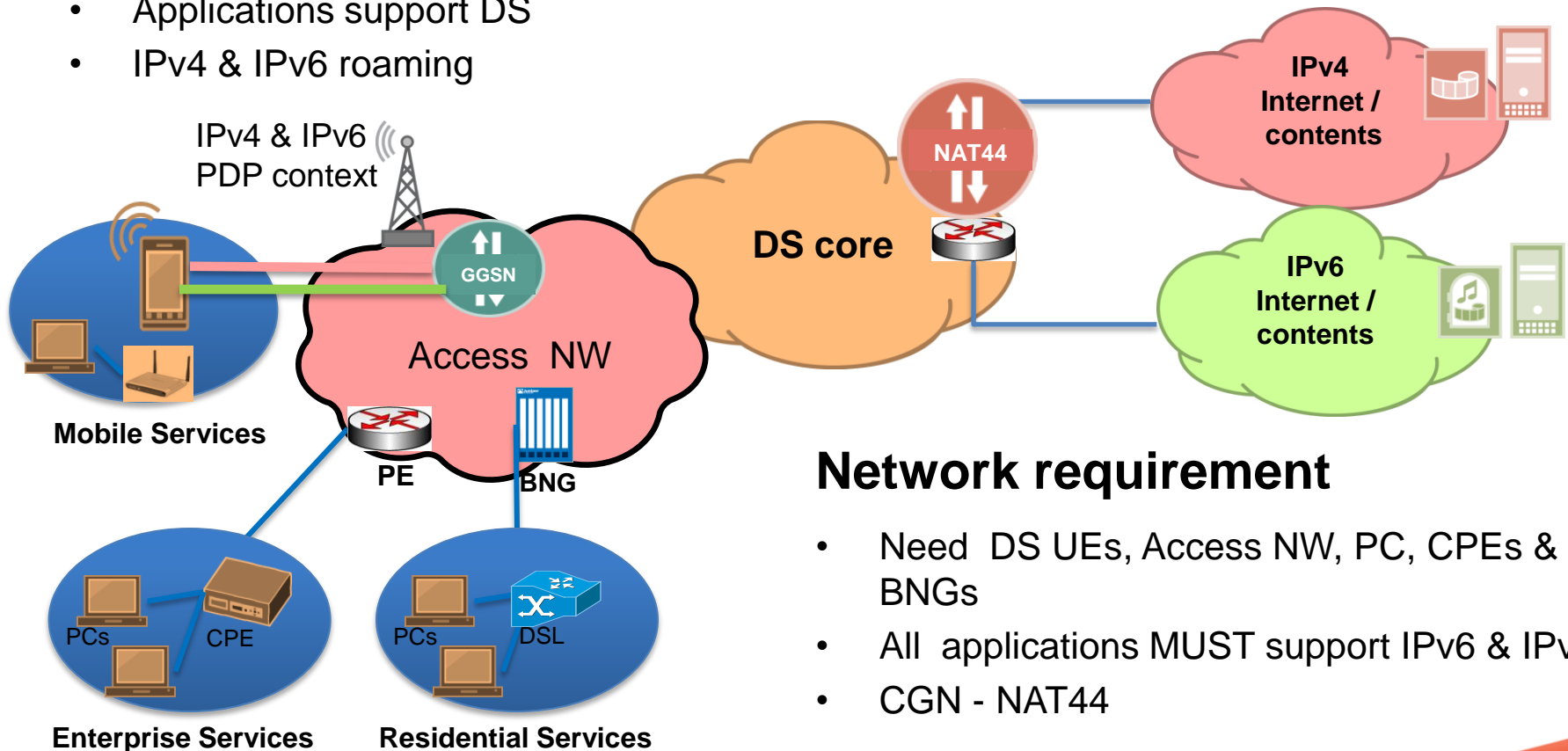


Operator Transition Solution - Dual Stack

Customer Scenario

- DS CPEs
- Applications support DS
- IPv4 & IPv6 roaming

3GPP introduced dual-stack in release 8 for DS PDP contexts.



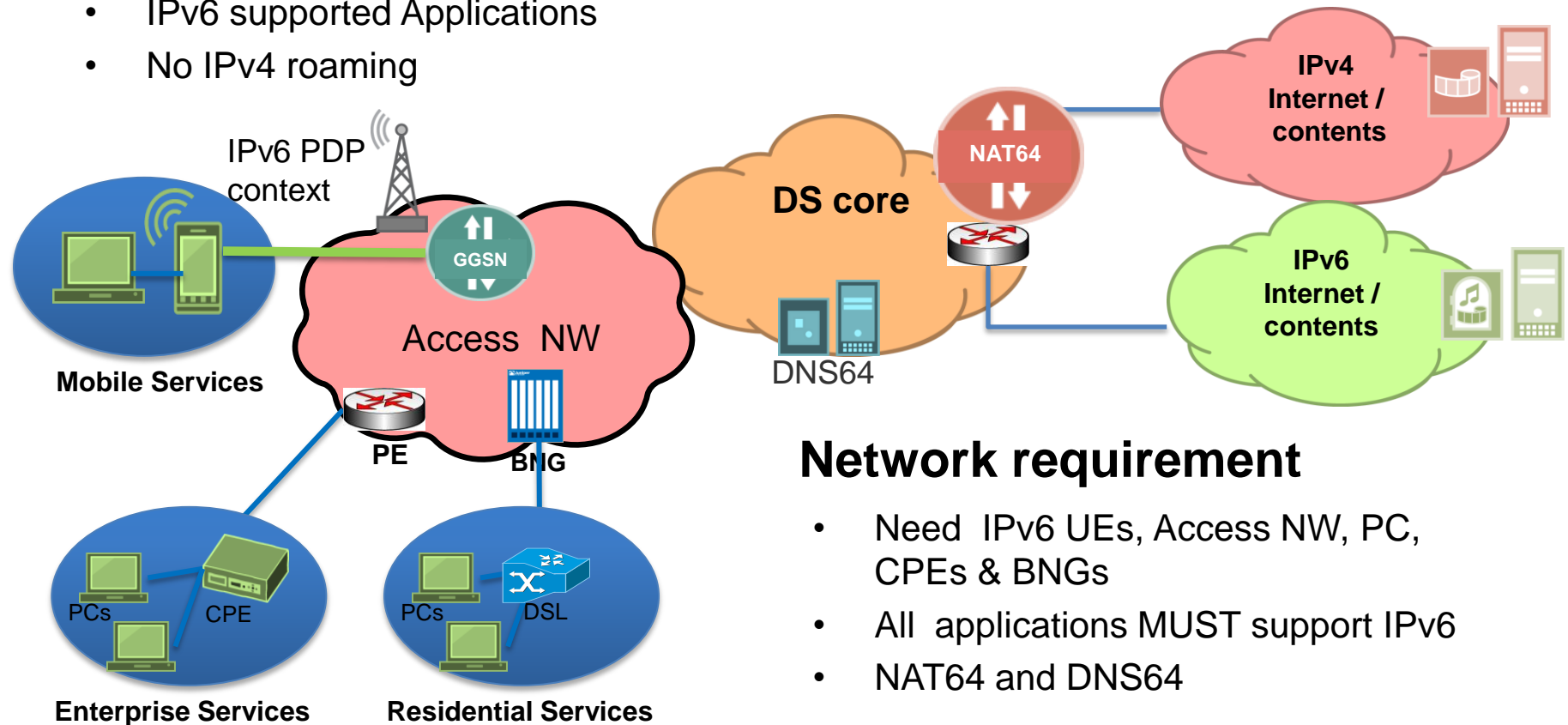
Network requirement

- Need DS UEs, Access NW, PC, CPEs & BNGs
- All applications MUST support IPv6 & IPv4
- CGN - NAT44

Operator Transition solution – All IPv6

Customer Scenario

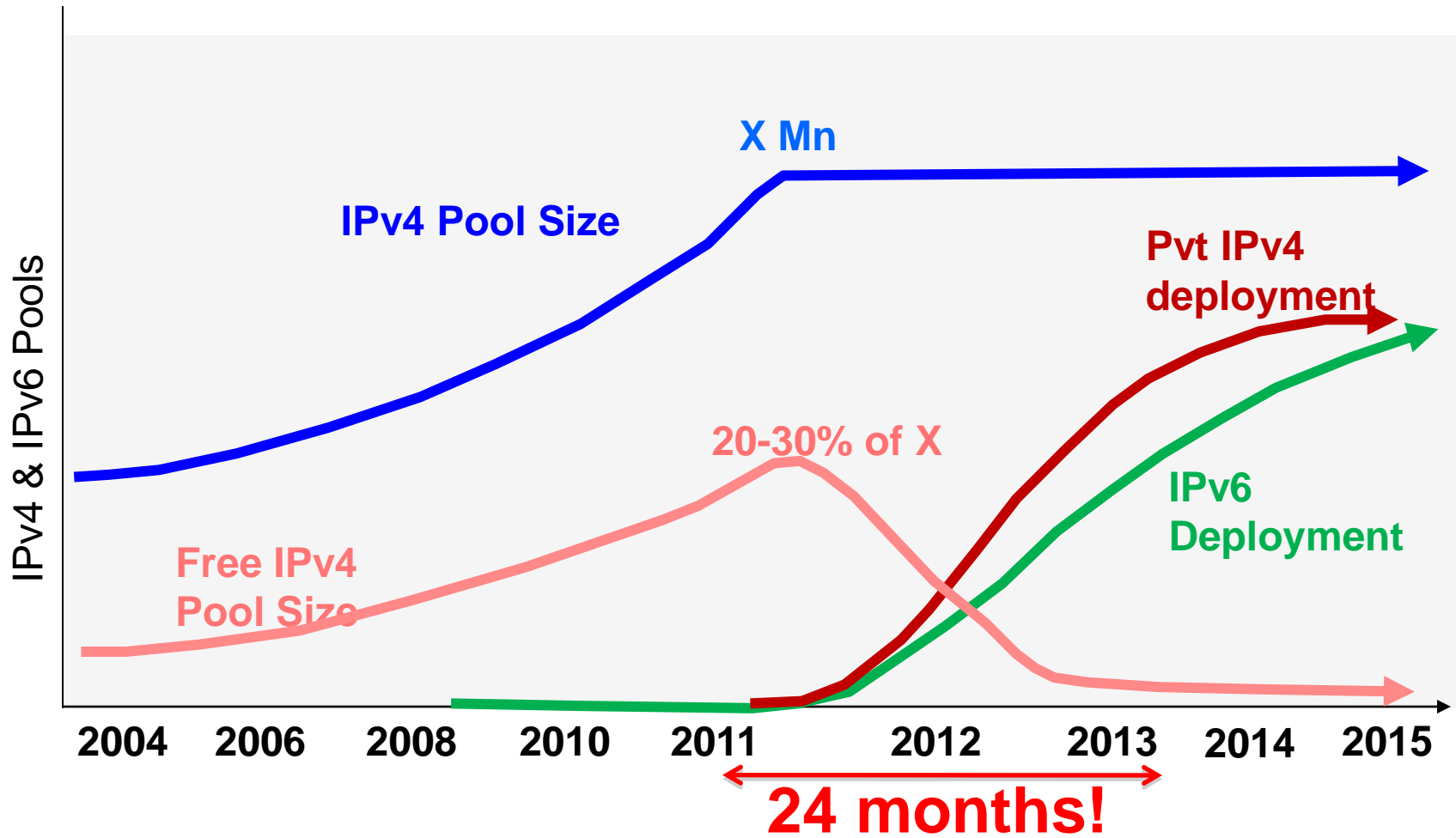
- IPv6 CPEs
- IPv6 supported Applications
- No IPv4 roaming



Network requirement

- Need IPv6 UEs, Access NW, PC, CPEs & BNGs
- All applications MUST support IPv6
- NAT64 and DNS64

IP Transition plan

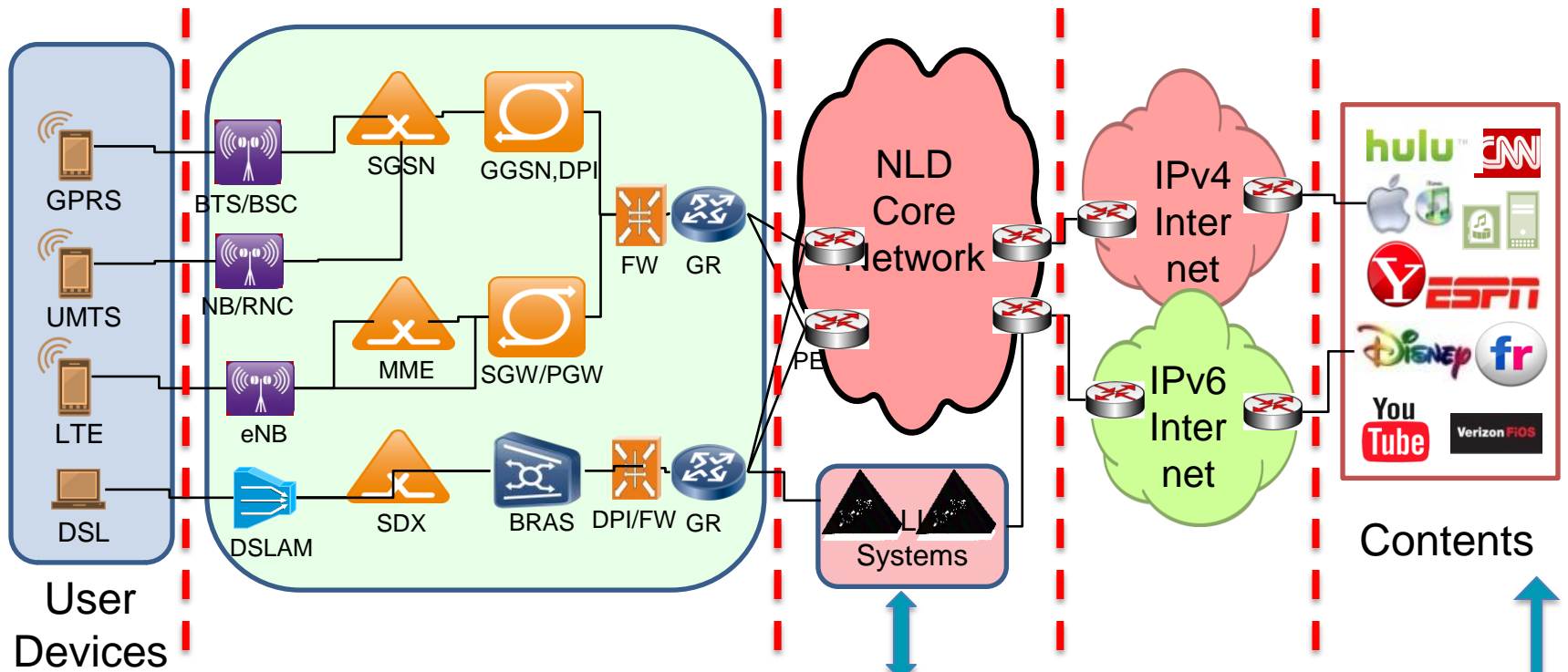


Services Transition Priorities

Network Services			
Priority	Services	Present IPs used	Future IPs
I	Core Transport Network	IPv4	DS - IPv4 & IPv6
I	Access / CEN	IPv4	DS - IPv4 & IPv6
I	2G, 3G	Pub IPv4	IPv6 & Pvt IPv4
I	LTE	Pub IPv4	IPv6 & Pvt IPv4
II	LTE eNBs	Pvt IPv4	IPv6
III	Mobile hosted services	Pvt IPv4	Continue Pvt IPv4. IPv6 after depletion.
II	Wireline Broadband services	Pub IPv4	IPv4 & IPv6

Preservation of IPv4 and transition to IPv6 simultaneously.
Start in phases in from major cities for higher user coverage.

Challenges of IP eco system



Present challenges

- No control on User device readiness. (0.9Mn/26Mn support IPv6)
- <5% contents on IPv6. No regulation to drive at present.
- Any NAT solutions need review of regulatory compliance requirements.
- Translation shall potentially degrade customer QoE
- Low demand from business customers.

Unavoidable Network complexity

Present

- Only Public & Pvt. IPv4
- Mostly Native without translations
- All Applications supported
- LI compliance without transaction log storage
- Simplified service delivery and assurance.

After

- Co-existence of Pub. IPv4, Pvt. IPv4 and IPv6
- Native, Translation (NAT44, NAT64 & DNS64) and possibly tunneling (6RD)
- Few messaging, gaming, streaming may not work. (testing critical)
- Storage for traceability required
- Operations more Complex

YR 2011

YR 2012 +

Note: Text in green shall be new in IPv6 eco system

Airtel status and support to Industry

- All NLD and ILD core pops ready with dual stack.
- Aggressive business customer trials
- Dual stack peering with upstream carriers.
- Dual stack peering with NIXI and private operators.
- OSS/BSS in process of readiness for IPv6.
- Mobile user plane infrastructure upgrade on progress.
- Upgraded dual stack with CDN providers.
- CGNAT trials completed for all services.
- Conducted training and awareness programs at major cities.
- Supporting all major lead working groups for readiness.
- Supporting DoT initiatives for readiness of all stake holders

Summary

Transition is inevitable. Need collective effort.

Cost of transition increases with time to start.

Develop your own priorities and transition mechanism.

Service POC is must for impact on user applications

IPv6 is not Y2k but impact is much bigger.

thank you

