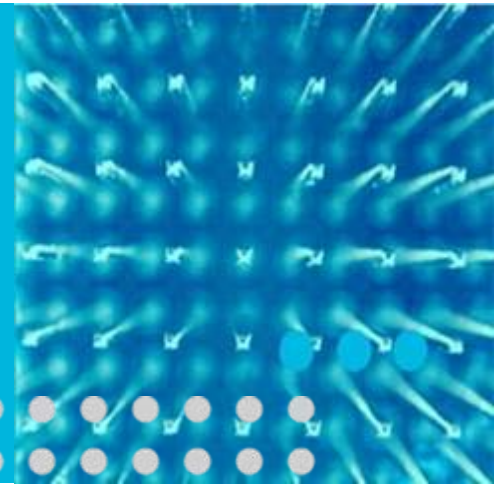


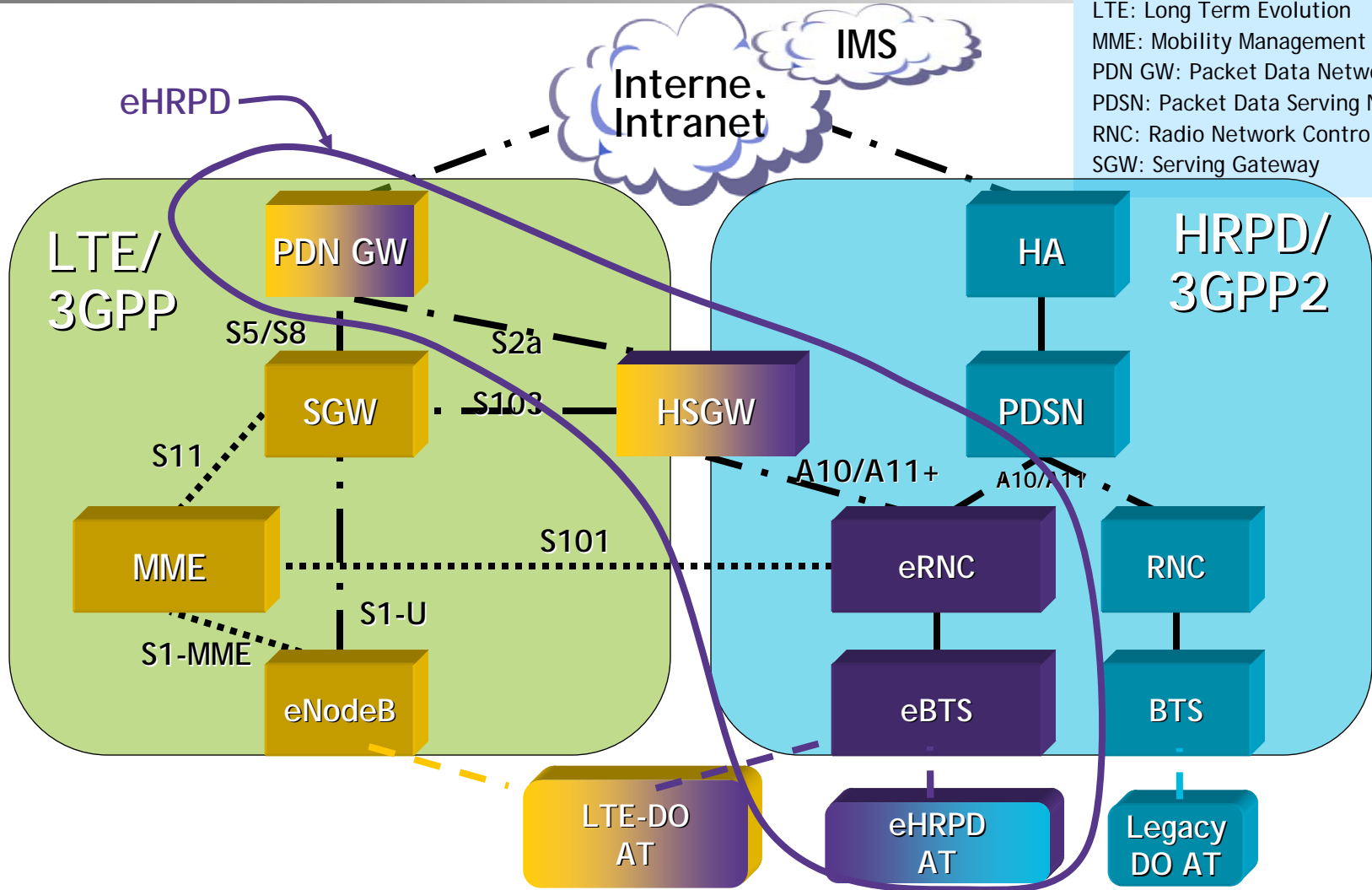
Migration to LTE: Infrastructure Impact



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LTE to eHRPD/HRPD Interworking

AT: Access Terminal
 eRNC: Enhanced RNC
 HA: Home Agent
 HRPD: High Rate Packet Data
 HSGW: HRPD Serving Gateway
 LTE: Long Term Evolution
 MME: Mobility Management Entity
 PDN GW: Packet Data Network Gateway
 PDSN: Packet Data Serving Node
 RNC: Radio Network Controller
 SGW: Serving Gateway



ALU is pioneering cost-effective multimode solutions for HRPD/LTE in standards and network and handset product solutions

Key Questions to Consider for LTE enhanced Packet Core Deployments

Network Topology:

- What applications will be used with LTE?
 - High speed data? Video services? Mobile to mobile applications? Voice telephony? Fixed wireless & fixed/mobile convergence?
- What are projected traffic models?
- Design topology for voice, best-effort data, mobile peer-to-peer applications?
- What are geographic redundancy & load sharing plans?

Reuse of Existing Packet Core Equipment vs. New:

- Consider how old is existing equipment - is it up for the task?
 - Consider extra traffic demands LTE will put on it
 - Playing a part in the open application value chain: Importance of DPI & policy management
- Consider benefits of integration with backhaul concentration routers?
 - Integrated E2E IP QoS management
- Consider the network topology - same as before, or more distributed?
- Co-location of functions in a single platform?
- Application optimization schemes (e.g. leveraging multiple PDN capability)?

Radical changes or evolution?

	Existing paradigm (3G)	How long?	LTE	R / E ?
Voice	Circuit switched	20 years	- no Circuit Switched core - all voice is VoIP	R
Broadband services	Today: Best effort (WAP, SMS), Limited expensive "broadband"	10 years	Real-time, interactive, low latency, true broadband QoS	R
Network data delivery to terminals	Possible in theory via GPRS; Mostly blocked by the operators	since SMS	Possible and probable: fully managed and charged by PCRF; network protection by DPI (optional)	R
Multisession data	"Wait until you finish with mini-web browsing or the long conference call, so you can get your push-emails"	n/a	All about bearers, sessions, flows: - user-initiated - network-initiated	R
QoS	No e2e QoS - only CoS! In theory: up to 8 CoS In practice: 2-4 (voice/control, best-effort data)	Since R4	9 QoS, strictly defined parameters, e2e QCI, SDF, bearers... (3GPP TS 23.207)	R
Policy Management	Theory: PCRF introduced in 3GPP R7 Practice: RADIUS authentication	Since R4	True network-wide policy control and management (PCRF, PCEF)	R
Mobility Management	Part of RAN; Mobility hidden from core network	From beginning	- no RNCs (radio mgt. by eNB) - mobility <u>visible</u> and moved to core (managed from the core network)	R-E

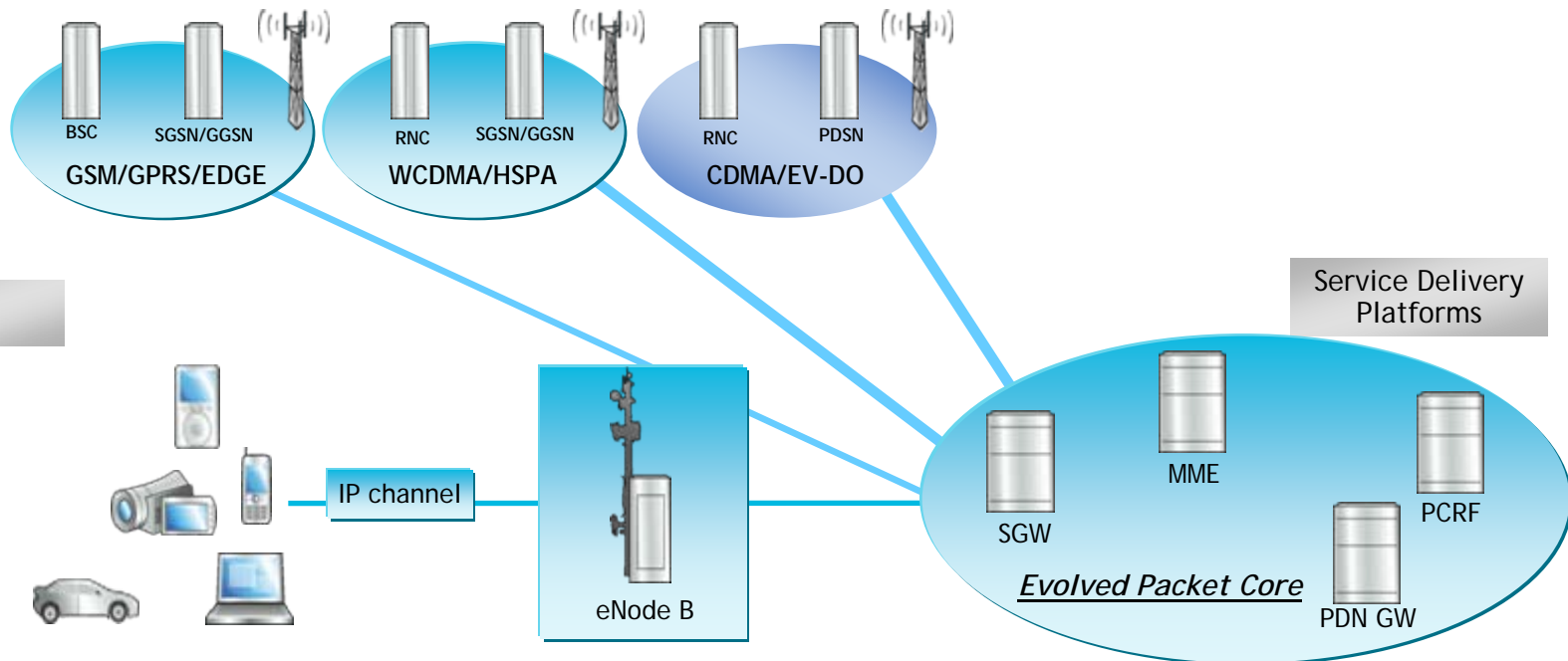
Key implications on user plane and control plane

User plane has many common attributes with fixed broadband

- Broadband capacity
- QoS for multi-service delivery
- Per-user and per-application policies
- Highly available network elements

Control plane gets new mobile-specific attributes

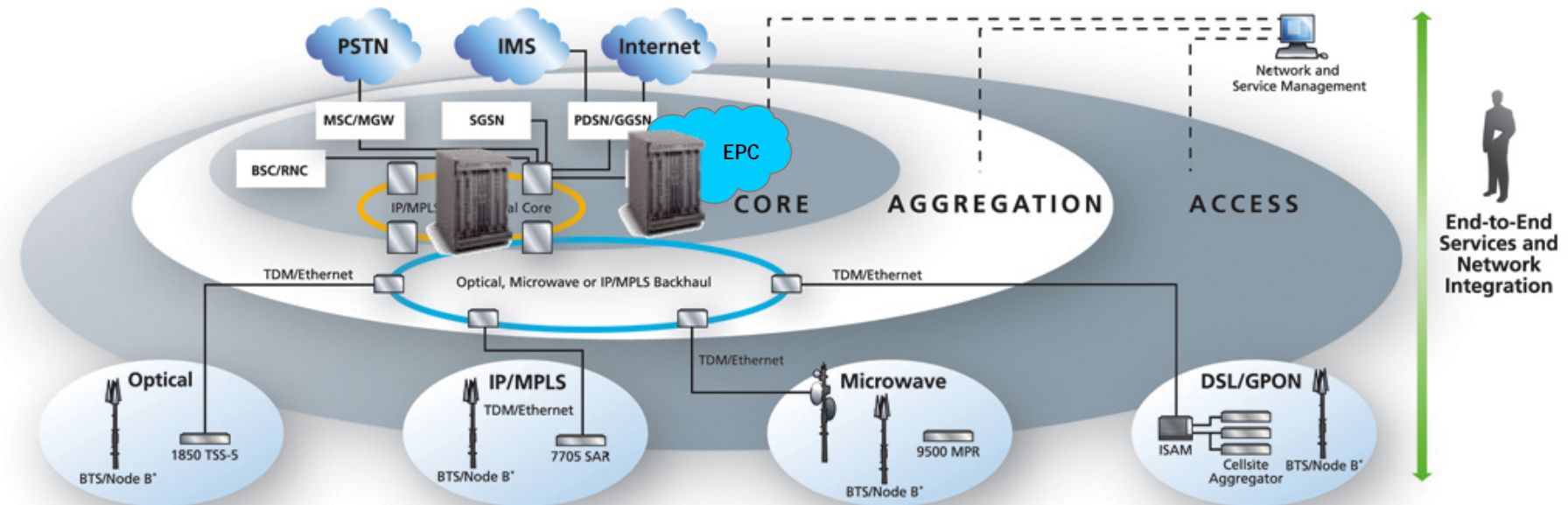
- Mobility across networks and operators
- Distributed mobility management
- Massive increase in scalability
- Dynamic policy management



Leverage Transport layer Convergence for Seamless Evolution

End-to-End IP nature of LTE facilitates convergence of Mobile-Transport layers to optimize performance

- ❖ Seamless convergence of backhaul/backbone networks for 2G/3G/LTE
- ❖ Deliver sophisticated consistent end-to-end IP QoS across mobile & transport layers
- ❖ Lower Total Cost of Ownership (TCO) via flexible alignment of mobility (EPC) functions with transport, backhaul and aggregation



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