



Network Evolution – PSTN in Transition

Moderator

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Panelists

Richard Ejzak, *Director, Corporate Standards, Alcatel-Lucent*

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PSTN Transition

Brian K. Daly, Moderator

AT&T Labs – Network Technologies



Network Evolution Objectives

Activities

**Develop Detailed
Requirements &
Recommendations for
Focus Group Report**

**Provide Targeted
Analysis &
Recommendations to
FCC's Technological
Advisory Council (TAC)
Working Group**

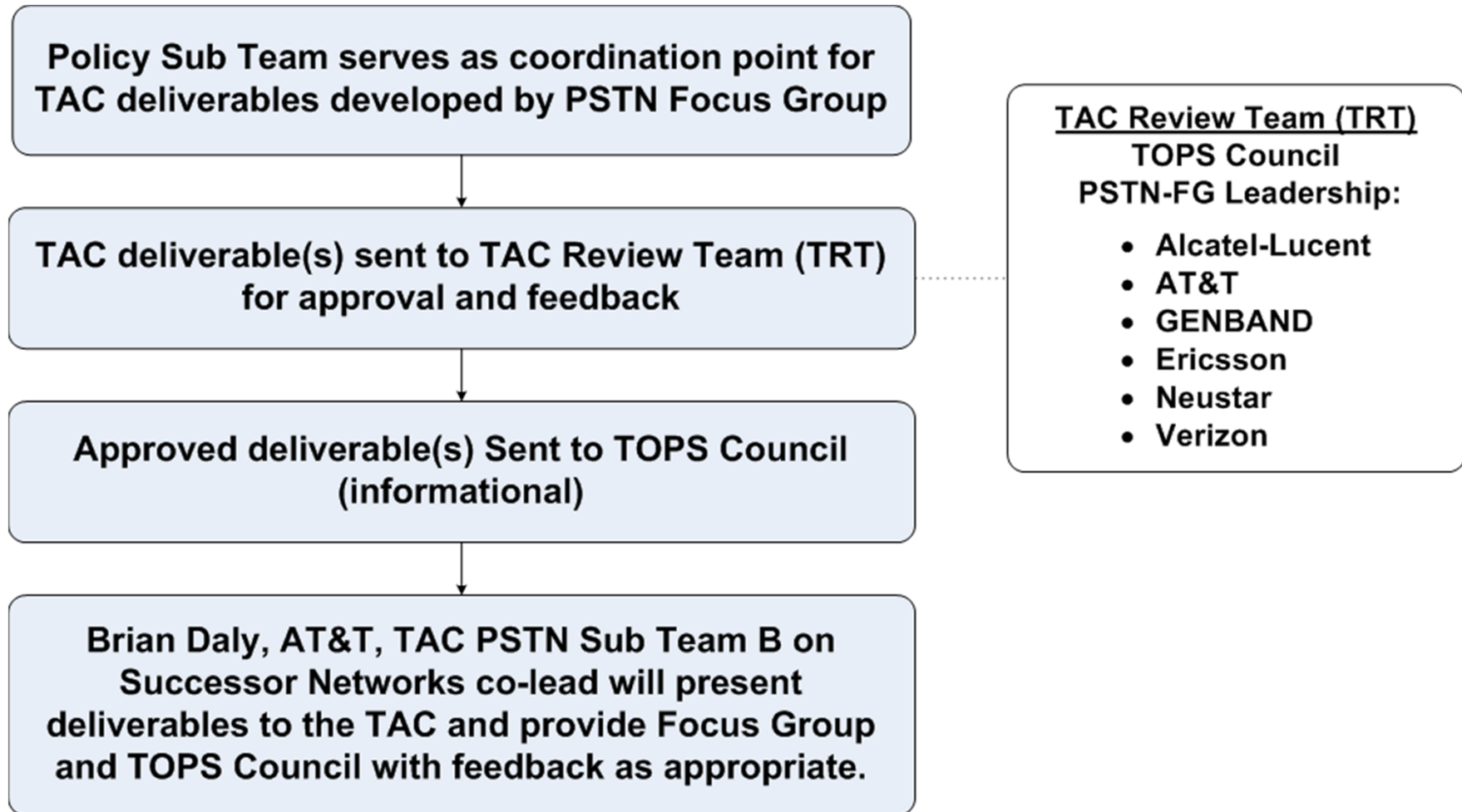
ATIS Focus Group Overview

- During 2012, the PSTN Focus Group developed the PSTN Transition Assessment and Recommendations.
 - Presented to ATIS Board & the Technology and Operations Council
 - High level conclusions shared with FCC TAC in Dec.
- Focus Group has completed work but is available to re-engage, as necessary.
 - FCC is launching a new task force to address IP Transition (policy, economic, legal, technical...)

FCC TAC PSTN Transition

- In 2011 and 2012, the FCC TACs have made a number of recommendations for effecting the transition from the PSTN.
- Total of seven Study Areas:
 - Copper Retirement (Re-Use)
 - PSTN User Impacts
 - Interconnection
 - Database Transition
 - Numbering (User/Service/App Identifiers)
 - Quality of Service
 - Robustness and Public Safety
- Consolidated recommendations to the FCC in three areas:
 - Databases and Identifiers
 - QoS and Interconnection
 - Robustness and Public Safety
- Focus for 2013+ should be planning for transition

TAC Communication Process



PSTN Transition Subteams

Application Services

*Chaired by
GENBAND*

- PSTN Services in Transition
- New Services
- Successor Networks
- Protocol Issues
- Evolving Applications environment

Access

*Chaired by
Ericsson*

- End user access issues
- Alternative accesses
- Customer Expectations
- CPE Stranding
- User-related Regulations

Transport

*Chaired by
Alcatel Lucent*

- End-to-end Communication
- Interconnect Models
- Routing
- Authentication
- QoS, Security
- Emerging Technologies

Numbering

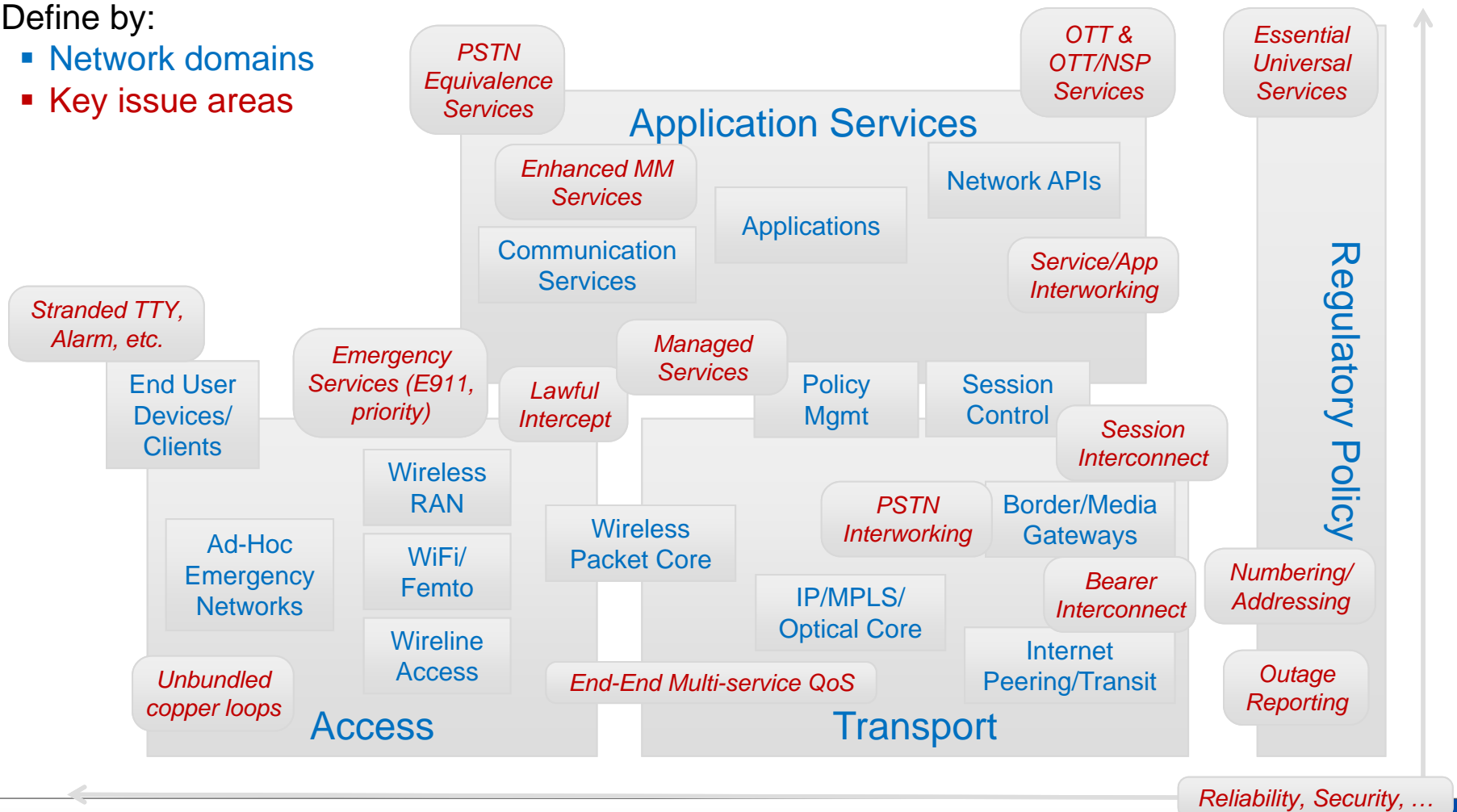
*Chaired by
Neustar*

- Addressing
- Administration
- Numbering Authentication
- ENUM capabilities
- Databases

Sub-Team's Scope of Focus

Define by:

- Network domains
- Key issue areas



PSTN Transition Report

- PSTN Transition Assessment and Recommendation report has been completed.
- Evaluated the network's current state and defines opportunities for new and richer communication capabilities that the successor network will deliver.
- Assessed key issues in the transition across four areas of network evolution: application services, access, numbering, and transport.
- Represents the only comprehensive industry resource outlining the key considerations for decision makers on all aspects of network evolution.

ATIS Focus Group Participants

- Adtran
- Alcatel-Lucent
- AT&T (co-lead)
- Bell Canada
- CenturyLink
- Cisco
- Ericsson
- GENBAND
- Huawei
- JDSU
- Juniper
- Neustar
- Qualcomm
- Time Warner Cable
- Verizon (co-lead)



PSTN Transition Transport Sub-team

Richard Ejzak

Director

Corporate Standards

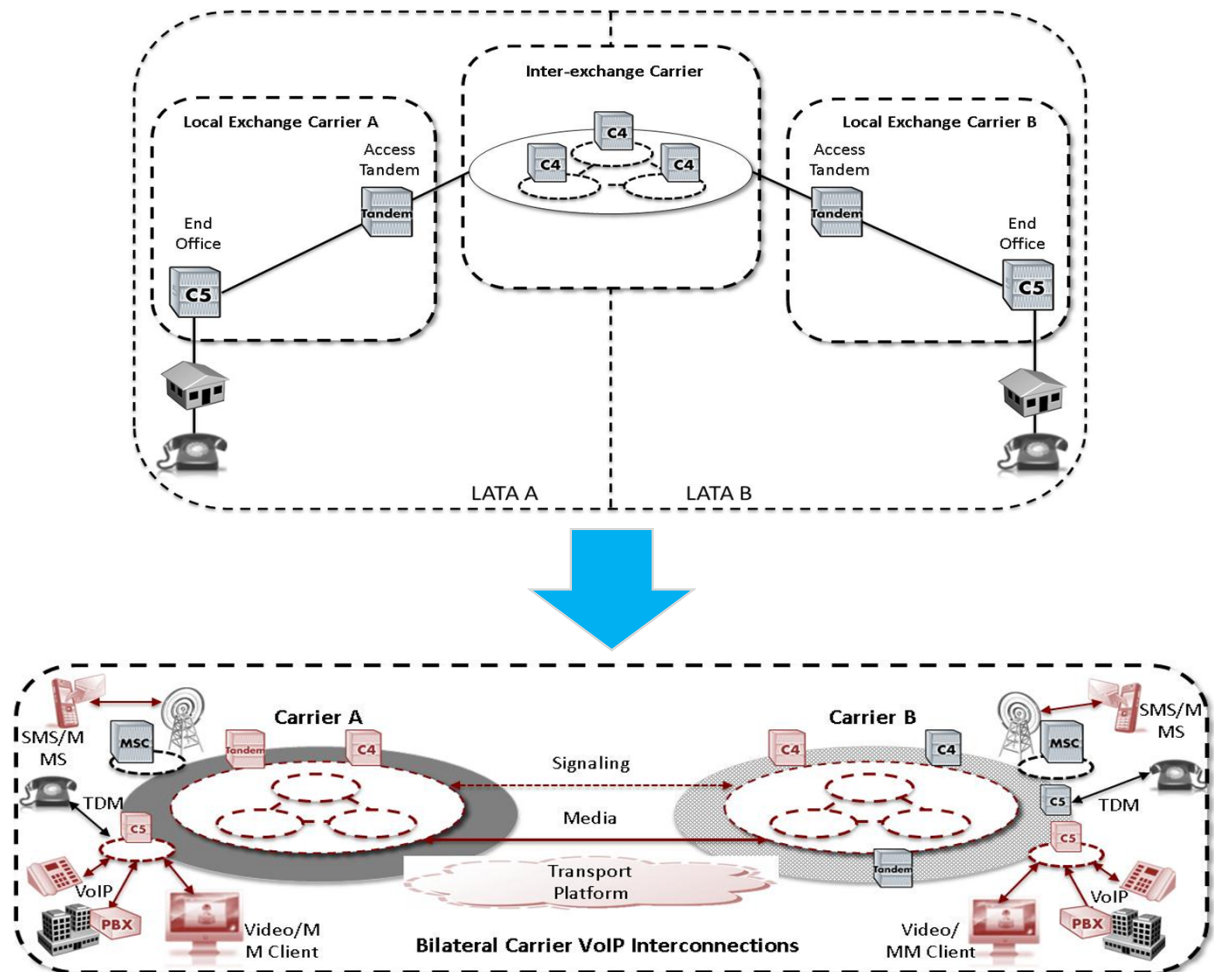
Alcatel-Lucent

Outline

- Transition to IP interconnect
- IP interconnect models
- Key issues
- Simple interconnect business model
- Observations
- Recommendations

Transition to IP Interconnect

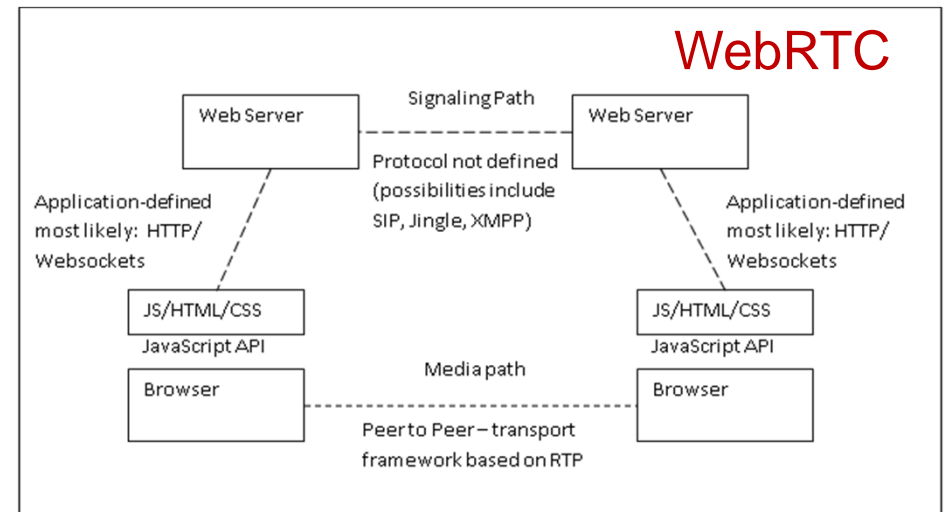
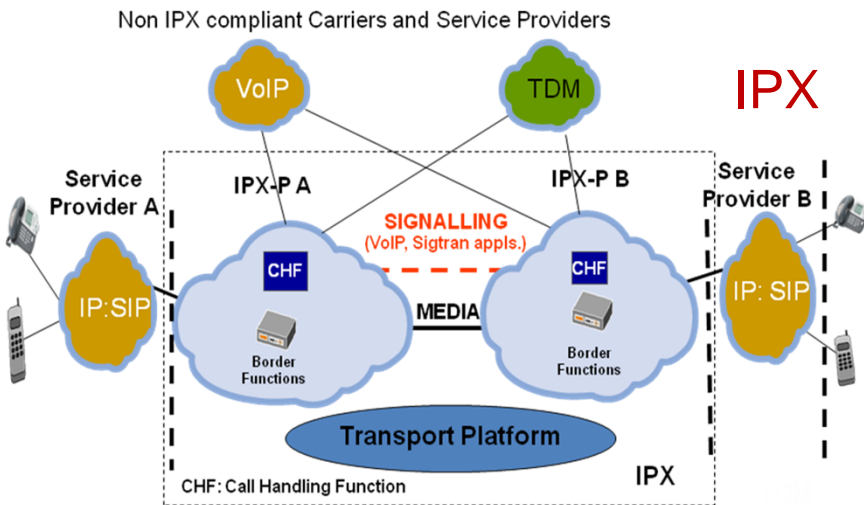
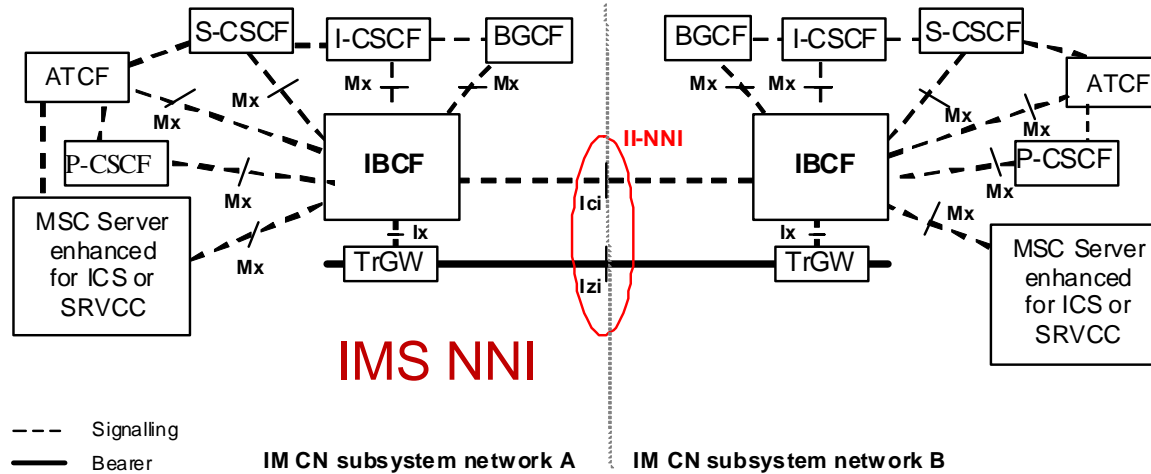
- As the interconnect architecture moves to IP, it becomes flatter, more direct, less tied to geography, in need of more security.
- Many technical options exist due to evolving standards and industry practices.
- Negotiated commercial agreements needed to resolve myriad technical and operational issues.
- Multiple “successor networks” will provide a wide range of services.



Interconnect Models

- Telecom industry models:
 - ATIS NGN
 - i3 Forum Bilateral
 - GSMA IPX (IP eXchange)
 - Transit interconnect with support for routing, multilateral hubbing, SLAs, KPIs, QoS
 - 3GPP IMS:
 - Core set of SIP-based specifications for Inter-IMS NNI, IMS to IP NNI, RAVEL, OMR, etc.
- Other models:
 - IETF protocols (SIP, ENUM, RTCweb, ICE,...)
 - SIP Connect
 - WebRTC
 - Google Talk Federation, Jingle (XMPP)
 - Skype, etc.

Additional Interconnect Architectures



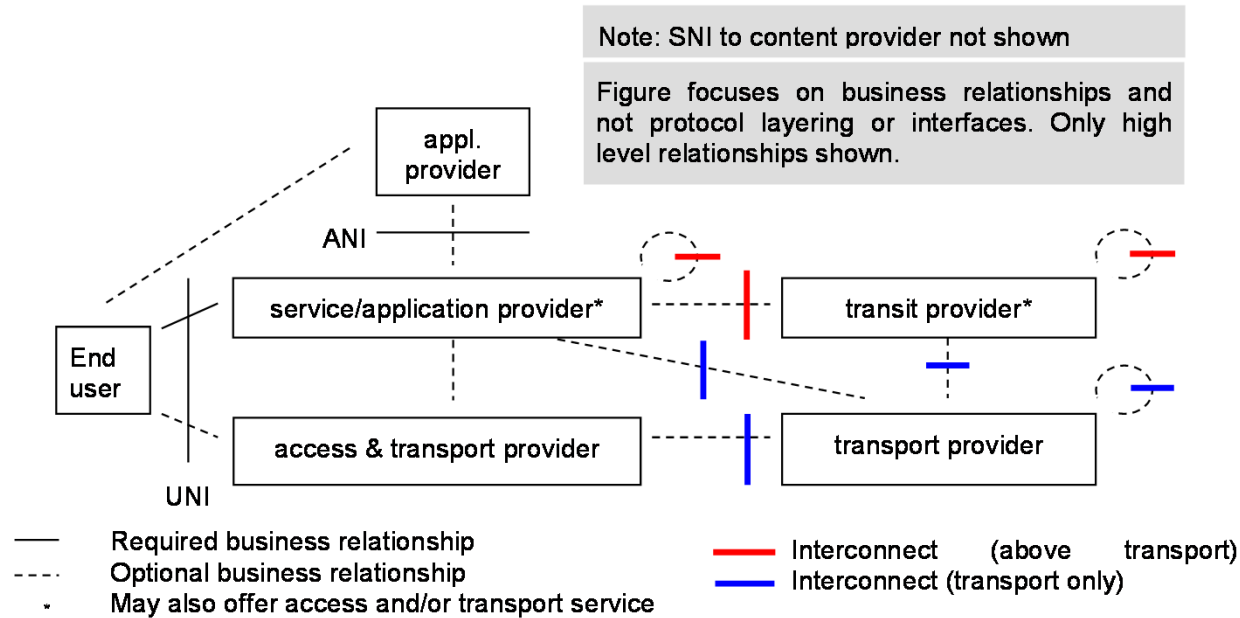
Protocol Interworking Options

- Support for video, WB voice, IM, and other advanced services
- Variants of SIP, SIP-I, XMPP and proprietary signaling protocols exist
- Addressing/routing (e.g., DNS, ENUM)
- Signaling and media security (e.g., IPSec, TLS)
- Provider identity and authentication (e.g., bilateral, CA, callback)
- Transcoding
- Managed vs. unmanaged (internet) transport
- QoS (e.g., packet marking)
- Fraud and attack (e.g., DOS) detection/prevention
- Charging conventions
- Bilateral and multilateral interconnect

Key Issues

- Addressing and routing
 - Direct interconnect requires access to address resolution
- Security
 - E.g., Identity verification to control SPAM calling
- QoS
 - Proliferation of networks using unmanaged transport
 - Access QoS most important
- Bundling of signaling with media
 - Most models assume availability of signaling along with media through managed transit networks to facilitate per-call charging for media transport – facilitated through media anchoring
- Charging
 - Transition from sending-party-pays to bill-and-keep

Simplified Business Model



- Models evolving to allow separation of service and access providers
- Business agreements evolving to separate provision of and charging for transit service and media transport

Observations/Trends

- IP interconnect would significantly advance with the availability of an industry-wide address translation and routing solution (e.g., ENUM)
- There is an increasing need for authentication of users and/or service providers to minimize fraud and spam
- The industry is moving from an established interconnection model to multiple models
 - The models have varying requirements (QoS, security, etc.) and compensation arrangements
 - Model diversity breeds innovation but eventually a few dominant models must prevail
- These unique QoS and security requirements will introduce new challenges and opportunities for managed communication services
- The PSTN transition is best served by allowing a gradual evolution of services and interconnection models
- The separation of service provider responsibility for communication services and IP access is a key driver for new interconnection models
- Emerging technologies and services (e.g., OTT, cloud, WebRTC, OMR) will significantly influence the evolution of interconnection models

Recommendations

- The industry should agree on a tiered routing architecture based on the carrier registering the user's TN
 - LATA routing is unnecessary
- Future interconnect models should support identity authentication of the users and access and service providers
 - To provide security, compensation support, and fraud/spam control
- Potential future ATIS activities:
 - Analyze emerging IP interconnection issues:
 - Technical issues such as security and QoS
 - Commercial issues such as the use/need for a multiservice model
 - Develop new IP interconnection models with the latest advances
 - Based on the evolution of existing voice and multi-service models
 - Encourage the voluntary convergence of the industry on a minimal set of the most broadly adopted models



PSTN Transition Application Services Sub-team

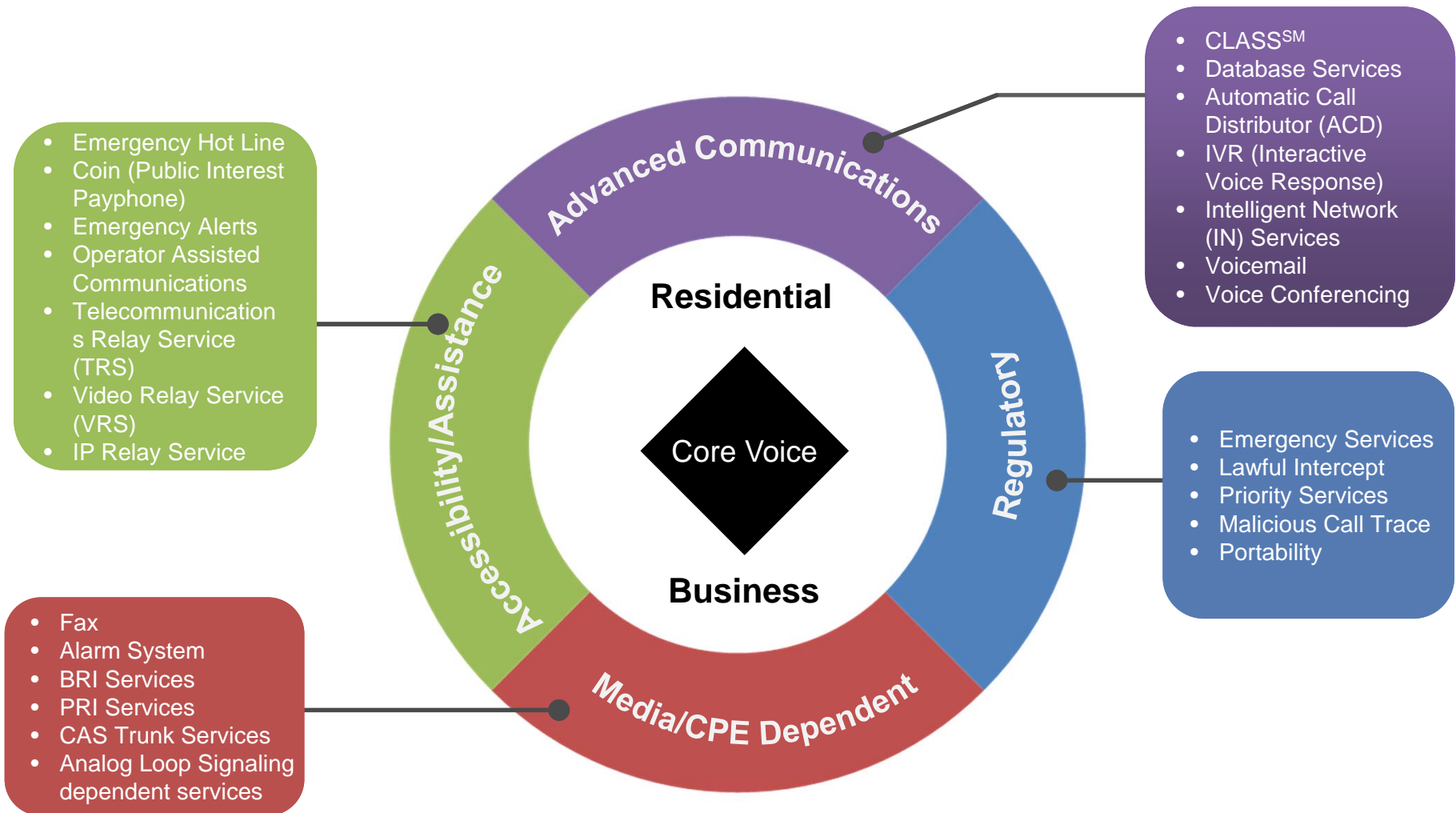
Carroll Gray-Preston

Senior Director

Technology and Planning

GENBAND

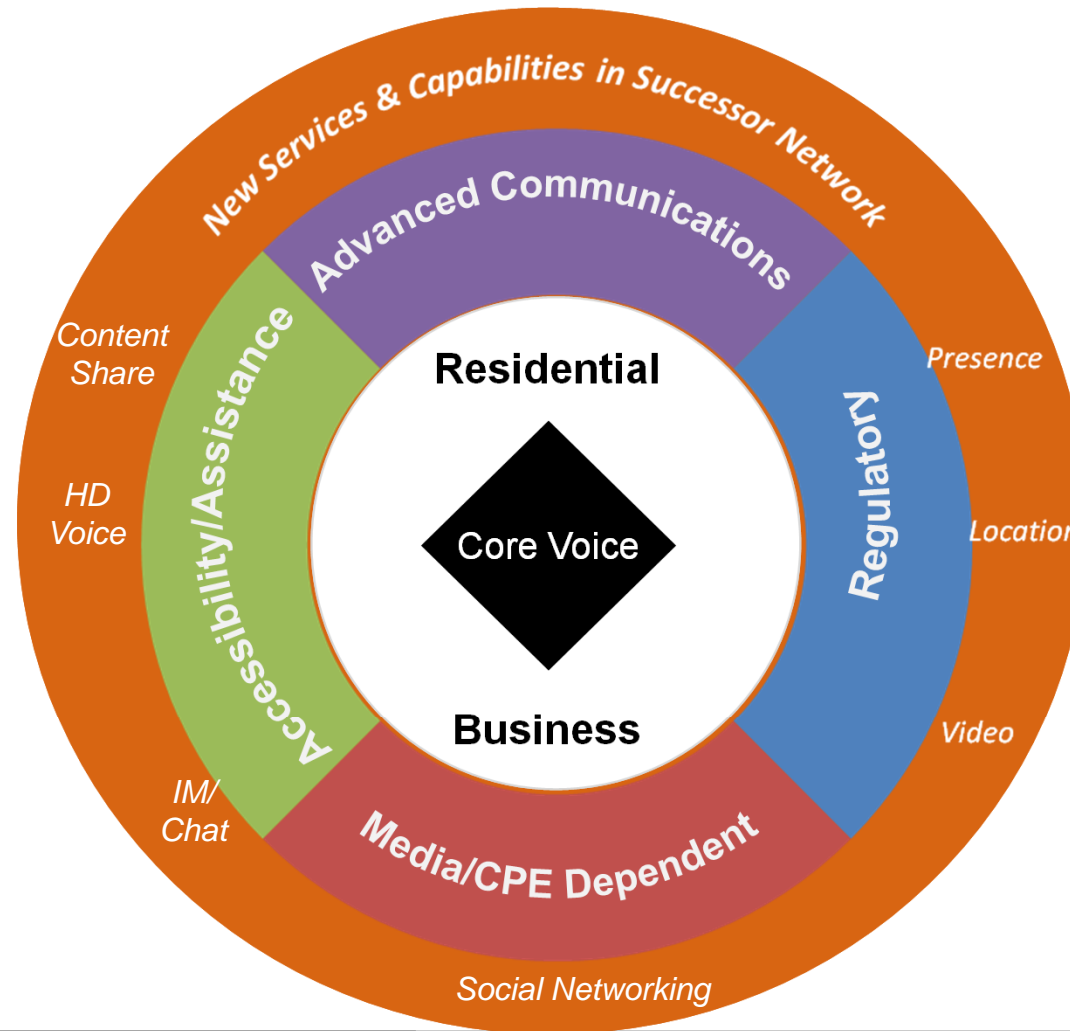
PSTN Applications Services in Transition



Applications Services in Successor Networks

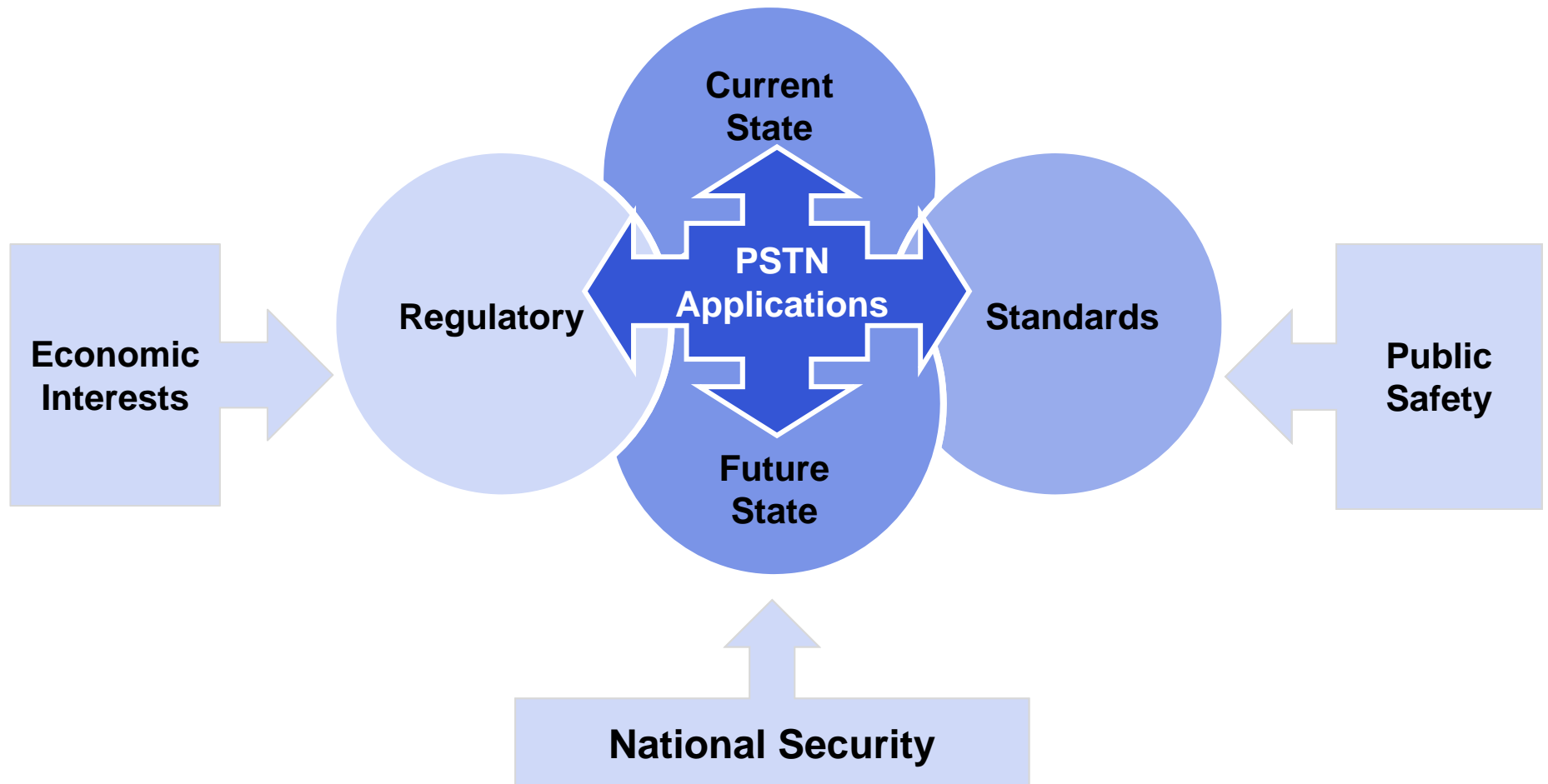
Consumers will have access to range of new application services

Key principles still apply – Market forces, standardization, self-regulation, and government oversight continue to influence definition

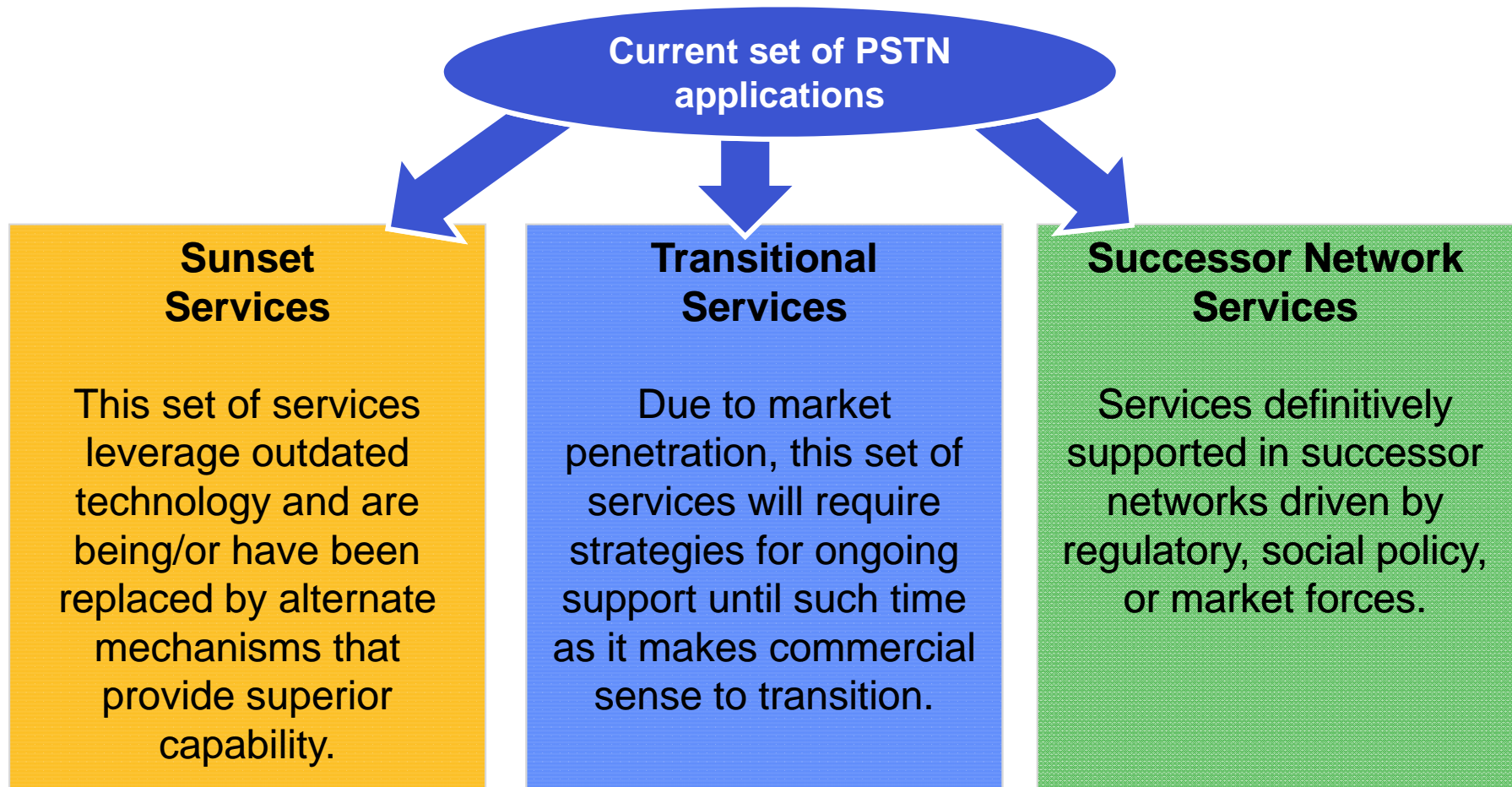


New applications defined today will evolve over time as more broadband services become available and achieve market penetration

Assessment Approach



Application Services Categories



Summary

- Significant number of current applications will be supported in both Transitional and Successor Networks, although they may be implemented or delivered in alternate forms.
- Solutions exist to support most legacy PSTN functions in next generation networks (currently in transitional phase).
- Relatively equal distribution of Services evolving to Successor Networks driven by regulatory considerations (e.g. emergency calling) vs. market demand.
- Recommendations for further study:
 - Calling number and name delivery privacy regulation
 - Portability

For most applications, business drivers will determine which applications migrate and how they do so



PSTN Transition

Mike Nawrocki

Director

Wireline Standards

Verizon



Access – Key Considerations

PSTN Assessment

Voice grade channels

Fixed lines (no mobility)

Access ▶ Voice Service Provider

Carrier-provided line power

Subscriber side signaling

Availability



Key Issues

Stranding of CPE
(Analog phones, fax, alarm, PBXs, etc.)

Loss of central office power

Robustness

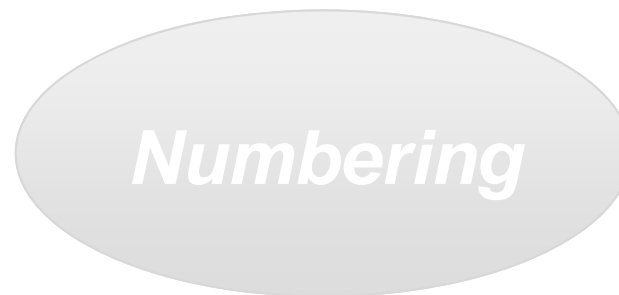
Access Summary

- Stranded CPE should be treated as an economic issue (not a policy issue), and in most cases consumers are voluntarily making the transition to better solutions.
- Removal of C.O. provided line powering is also an economic issue – emergency powering can be provided as a feature.
- Reliability and robustness in the future network are less dependent on underlying access network and can be engineered to various levels.

Numbering and Network Evolution

Legacy Rate Centers & LATAs

Geographic Linkage



*Interconnection
& Routing*

IP-routable addresses

Future of PSTN Names

Numbering – Addressing & Authentication

The industry should address the following open issues:

- Addressing:

- Administrative information exchange
- Discovery
- Mutual authentication
- Consider a TDM-to-IP addressing solution that conserves numbering resources

- Numbering Authentication:

- Ensure that telephone numbers on IP networks are secured against spoofing

Telephone Number Administration

The industry should investigate the following issues:

- Consider introducing expanded geographic area codes for traditional communications service.
- Consider breaking the linkage between geography of the TN and geography of the point of interconnection.
- Closely monitor number allocation and utilization.
- Assess the implications of direct consumer registration of TNs.
- Eliminate number allocation and assignment based on rate centers and LATAs.

Recommendations for ATIS

ATIS should perform the following actions (with the ATIS Packet Technologies and Systems Committee (PTSC) taking the lead and coordination function):

- Analyze the IP interconnection recommendations and determine the need for new specifications.
- Analyze the impact of emerging technologies and services (e.g., OTT, cloud, WebRTC, OMR) on future interconnection.
- Examine the impact on commercial issues, including the potential enhancements for multiservice support.
- Encourage the voluntary convergence of the industry on a minimal set of the most broadly-adopted models of interconnection.

Next Steps

- Transition responsibility for specific work items to ATIS PTSC.
- Continue to promote the PSTN Transition Report to key industry stakeholders.
- Work of PSTN Transition focus group is complete, but team will stay responsive to government & industry requests.

**Thank you for attending
*Network Evolution – PSTN in Transition***

Visit the ATIS Document Center to purchase a copy of the

***PSTN Transition Focus Group Assessment
and Recommendations***

www.atis.org/docstore