Roaming Ecosystem in LTE

PSCR 2010 Winter Conference

Martin Guilfoyle

BJ Neal

Agenda

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- Introduction to standards bodies (3GPP etc.) and The GSM Association
- Work items being undertaken in GSMA
- Introduction to roaming, data clearing and settlement
- Introducing IPX
- LTE roaming interfaces and scenarios

Introduction to Standards Bodies

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- Originally there were several regional standards bodies
- USA – ATIS
- Europe – ETSI
- China – CCSA
- Korea – TTA
- Japan – ARIB and TTC

Introduction to Standards Bodies

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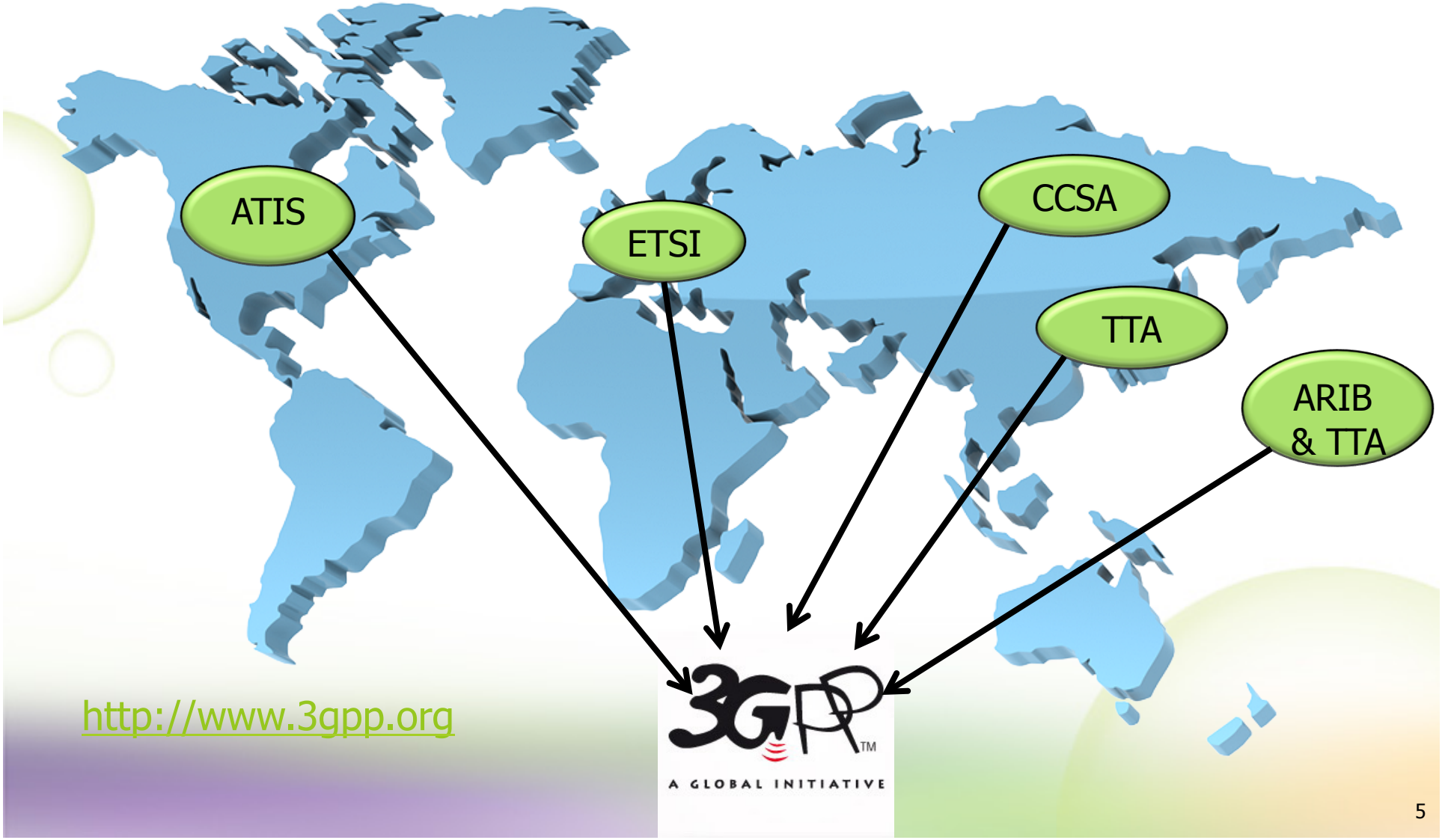

http://www.3gpp.org

GSM Association

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- Headquarters in Dublin and London
- Headed by a CEO Board and Executive Management Council
- Three categories of membership:
  - Full member (GSM operators)
  - Associate member (suppliers, vendors etc.)
  - Rapporteur member (non-GSM operators)
  - Information about membership: http://www.gsmworld.com/about/membership/index.shtml
- Working groups
  - Working groups meet regularly to address specific areas related to wireless communications and roaming
  - Comprised of volunteers

GSMA Working Groups

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- Billing and Accounting Roaming Group (BARG)
  - Supports international roaming, focusing on financial, administrative and procedural issues.
- Interconnect Working Group (IWG)
  - Created by the GSMA to bridge the technology gap between the multiple incompatible technologies.
- Transferred Account Data Interchange Group (TADIG)
  - Responsible for defining data interchange procedures between operators.
- Inter-Working Roaming Expert Group (IREG)
  - Specifies technical, operational and performance issues supporting international roaming.
- Roaming and Interconnect in LTE (RiLTE)
  - Responsible for defining how roaming and interconnection will be enabled in LTE.

Introduction to Roaming

Steps to Implementing Roaming Agreements

- GSMA provides roaming agreement templates to help operators establish roaming agreements. However, operators are free to modify them or create their own
- Roaming partners negotiate the roaming agreements, then perform network testing and billing testing before going live
  - Network testing (IREG testing) – test calls to ensure roamers can use the VPMN's services
  - Billing testing (TADIG testing) – test TAP records to ensure billing information is captured correctly and can be processed by the HPMN's billing system

Roaming Agreements

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- AA.12, International Roaming Agreement
  - General terms and conditions
- AA.13, International Roaming Agreement – common annexes
  - Items specific to the roaming agreement between the two roaming partners
  - Examples:
    - Agreed settlement procedure (e.g., direct payment, netting)
    - Testing
    - Security
    - Signaling interconnection and/or IP connectivity
    - Data privacy
    - Fraud prevention procedures

Roaming Agreements

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- AA.14, International Roaming Agreement – individual annexes
  - Published by an operator to specify items that apply to all roaming that takes place in its network
  - Examples:
    - Contacts
    - Services available
    - Interoperator tariffs (IOT)
    - Invoicing information
    - Customer care information
    - Testing and testing contacts
    - Data privacy
    - Fraud prevention procedures
    - Billing and transfer information
    - BID annexes

Transfer Accounting Protocol (TAP)

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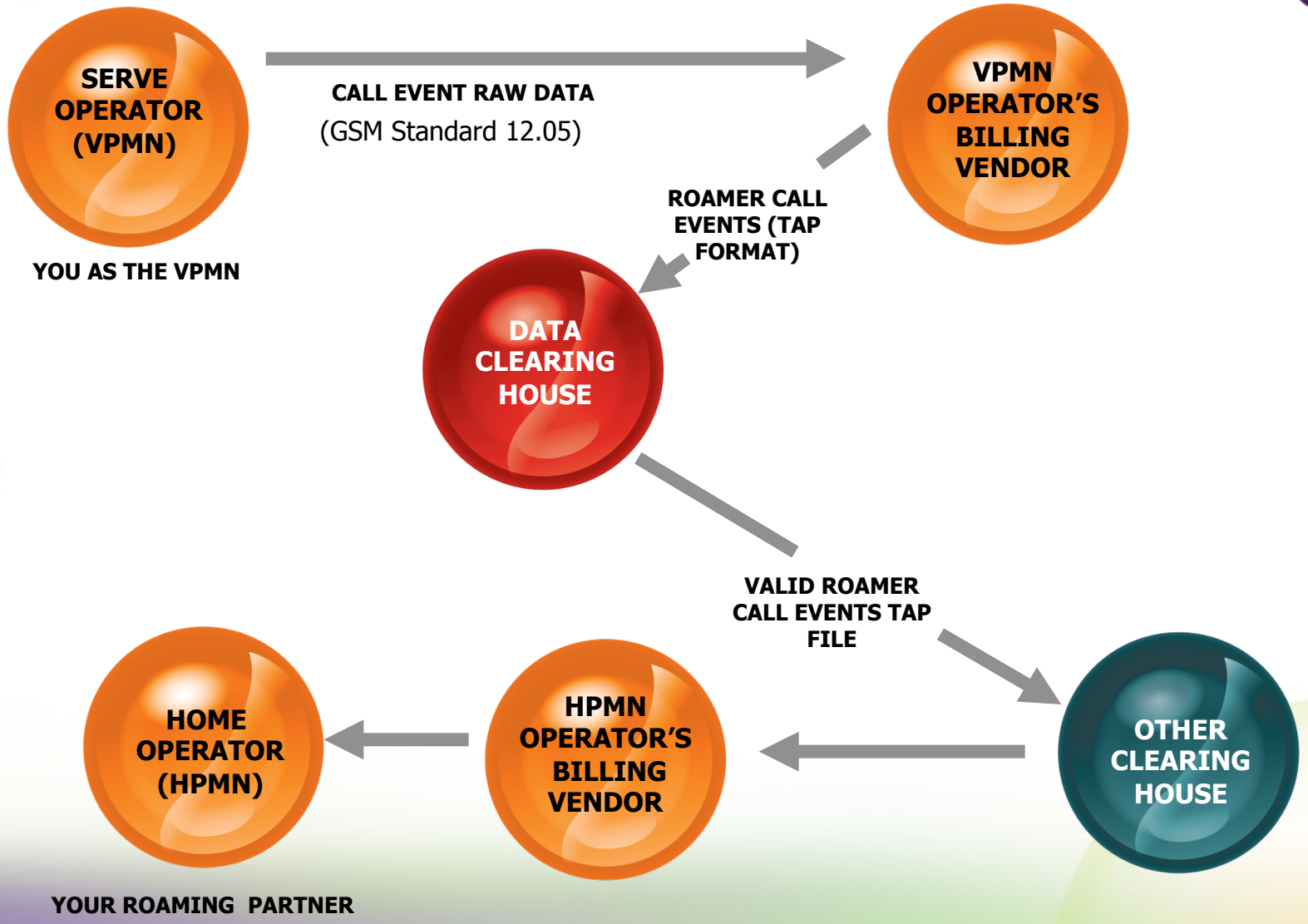
- Provides a method to exchange billing records between roaming partners
- Defined in the Transfer Accounting Data Interest Group (TADIG) of GSMA
- Used to provide a monthly financial (MFS) statement of usage
- MFS is used to settle positions, how much do you owe, how much are you owed
- Financial settlement is based on the MFS

TAP Flow


SERVE OPERATOR (VPMN)
YOU AS THE VPMN
CALL EVENT RAW DATA
(GSM Standard 12.05)
VPMN OPERATOR'S BILLING VENDOR
ROAMER CALL EVENTS (TAP FORMAT)
DATA CLEARING HOUSE
VALID ROAMER CALL EVENTS TAP FILE
OTHER CLEARING HOUSE
HPMN OPERATOR'S BILLING VENDOR
HOME OPERATOR (HPMN)
YOUR ROAMING PARTNER

Introduction to IPeXchange (IPX)

GSMA - IP eXchange (IPX)

- Developed by the GSMA in cooperation with GSMA operator members
  - Evolution of GRX (GPRS Roaming Exchange)
- The IP eXchange (IPX) provides a commercial and technical solution to manage IP traffic
- The IPX is an interconnect service that is offered by a variety of carriers on a competitive basis but with common agreed technical specifications and using consistent commercial models
- The managed network environment is traffic engineered to support specific IP services at specific quality levels
- The IPX solution is a premium quality solution that promises error-free delivery of traffic while offering the flexibility to apply an appropriate level of quality as demanded by each different class of service

Value for Network Operators

- One network – multiple services – reduced cost
  - Facilitating ease of use and reduce OPEX
  - Higher throughput with lower cost
  - Quicker time to market for service interworking – efficient growth
- Differentiated CoS and end-to-end QoS with SLA
  - Unlike the Internet, will ensure a level of service and security
- Interworking between IMS and legacy systems
  - Facilitating migration to next generation networks
- Improved agreement management and cascade billing
  - Ensuring higher level of revenue assurance
- Session-aware interworking
  - Better network control

IP Packet eXchange

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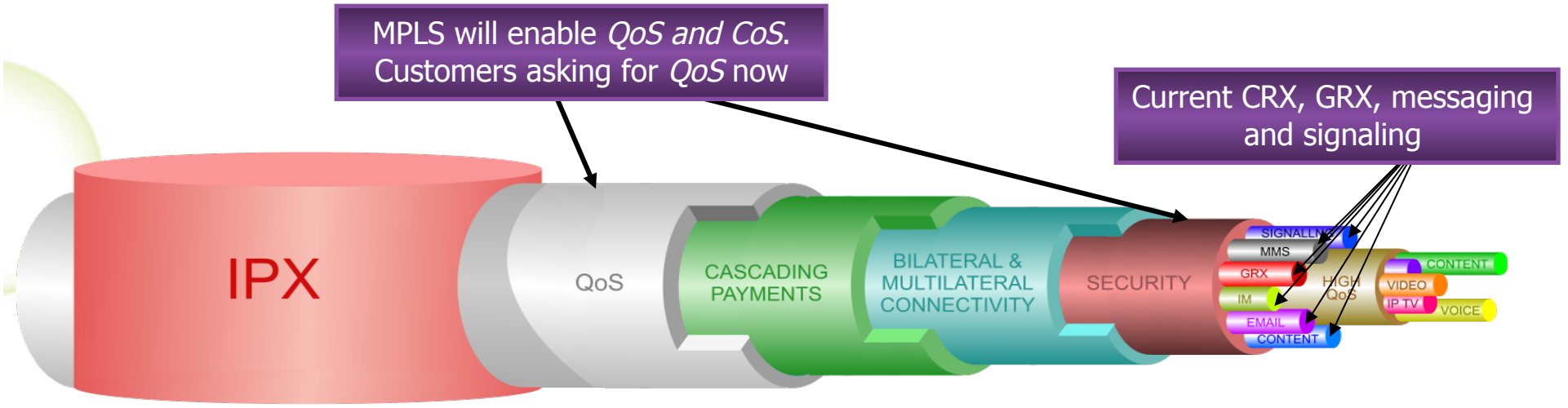

Multiple services over one network

IPX Security

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- Commercial agreements give protection to all players
  - Those connected to the IPX agree to sign up to a security code of conduct and a trusted community is created
- The IPX is not addressable from the Internet – which makes attacks much more difficult
- Individual operator traffic is segregated – thus localizing any security breaches
- End user terminals have no visibility of the IPX
  - They are unable to probe the core networks involved in the management and delivery of the IP services

IPX is a private backbone network

Services Enablement from Syniverse IPX

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- Signaling (Sigtran services)
- CDMA/GPRS/LTE roaming
- WLAN roaming
- Message interworking (MMS, SMS)

IPX Transport Services

- IP voice telephony (VoIP) – interworking
- IP video telephony – interworking
- Push-to-talk over cellular
- Advanced messaging and presence (GSMA RCS)

IPX Interworking Services

IPX is much more than a roaming network

LTE Roaming Scenarios & Interfaces

LTE Roaming Scenarios and Interfaces

- Signaling for registration and authentication is based on diameter interfaces
- Our main focus is on:
  - S6a MME to HSS
  - S6d SGSN to HSS
  - S9 hPCRF to vPCRF
- LTE to LTE only roaming
- CDMA to LTE roaming
- GSM to LTE roaming

LTE Only Roaming Interfaces

LTE Roaming Inter PS PMN Public PMN

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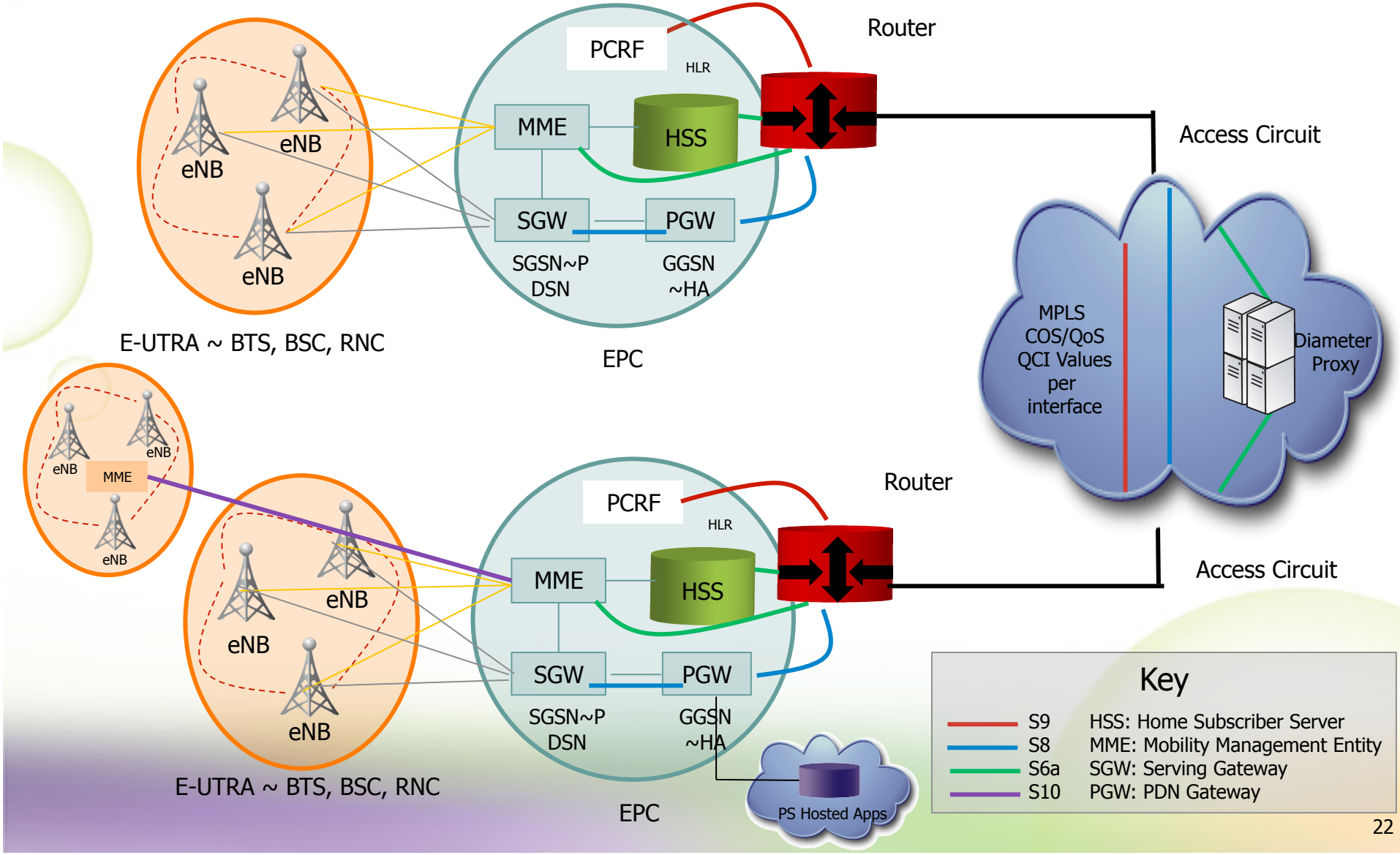
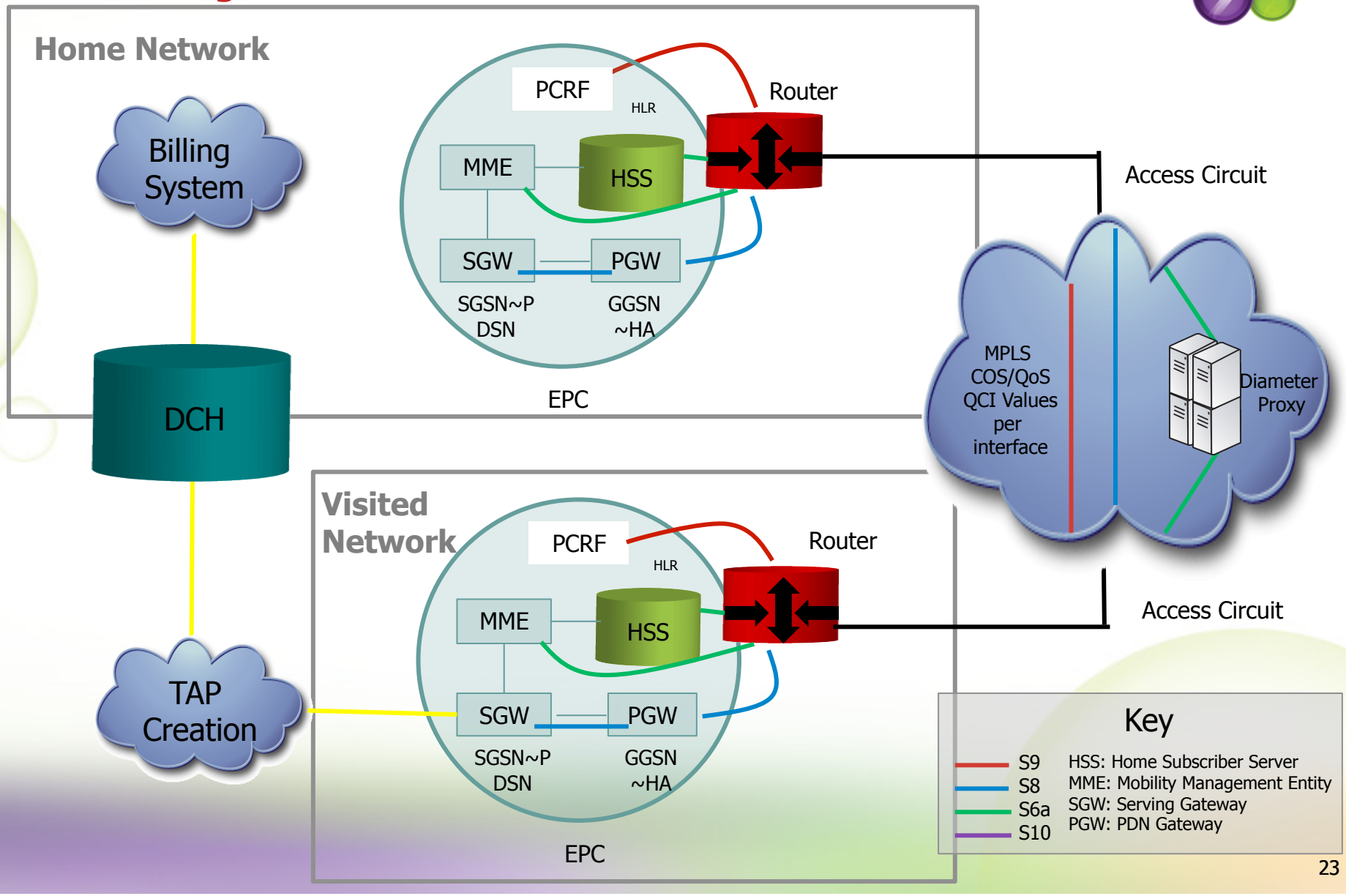


LTE Roaming Only – Logical TAP Flow

LTE Roaming Inter PS PMN Public PMN



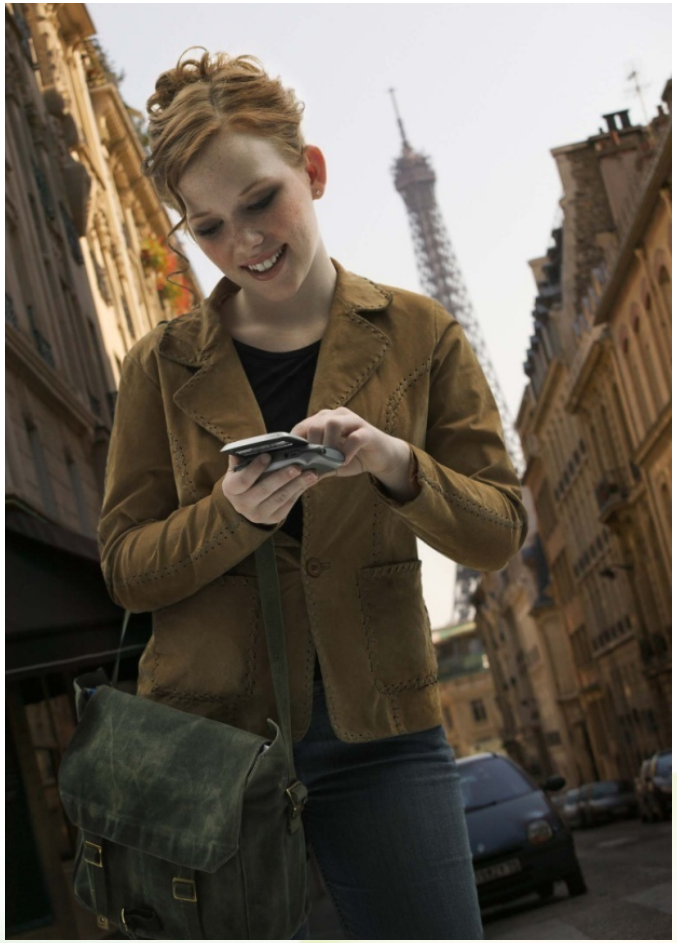
LTE Roaming Only – TAP Flow

- Call flow is PS entity roaming in another PS LTE market
- CDR is generated by serving gateway
- CDR is sent to TAP creation
- CDR is turned into TAP record, rated and placed in TAP file
- TAP file is sent to Data Clearing House (DCH)
- DCH forwards the TAP file to home network billing system

Syniverse: Who We Are

We make mobile work.

- Global provider of market-leading solutions that simplify the complexities of roaming, messaging, network interoperability and business intelligence for mobile operators, MSOs, enterprise verticals and emerging mobile providers
- Headquartered in Tampa, Florida, with offices in major cities around the globe
  - Europe, Middle East & Africa headquarters: Utrecht, The Netherlands
  - Caribbean and Latin America headquarters: Buenos Aires, Argentina
  - Asia Pacific headquarters: Hong Kong
- More than 1,300 employees in over 25 countries around the world; about 850 in North America



Simplifying Complexity

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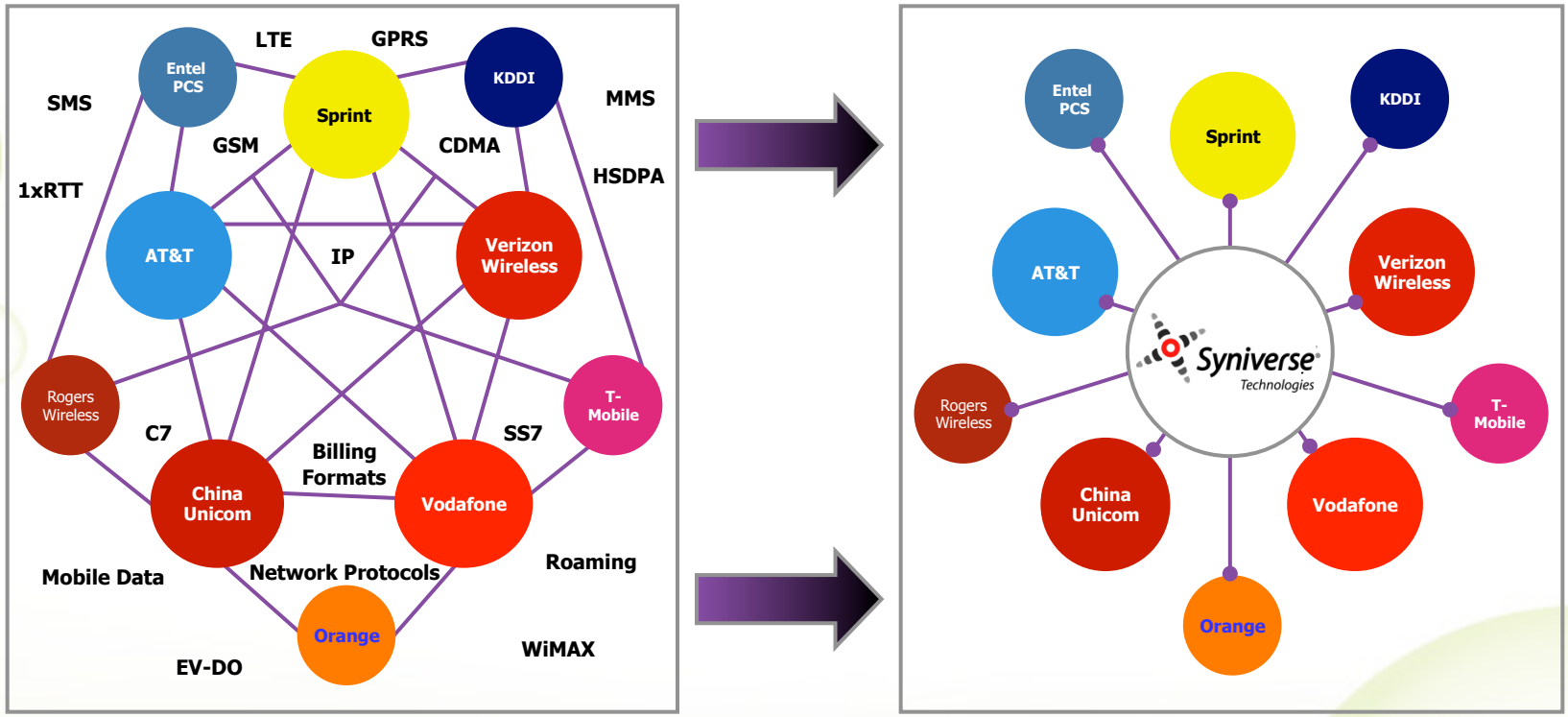
Industry growth and proliferation of technologies has significantly increased operator complexity and cost…

…which Syniverse simplifies.



Continued technological change drives increased complexity

Top-Tier Customers; Global Presence

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We serve the top ten operators in North America and nine of the top ten global operators.

More than 800 customers in over 160 countries

Track Record of Innovation

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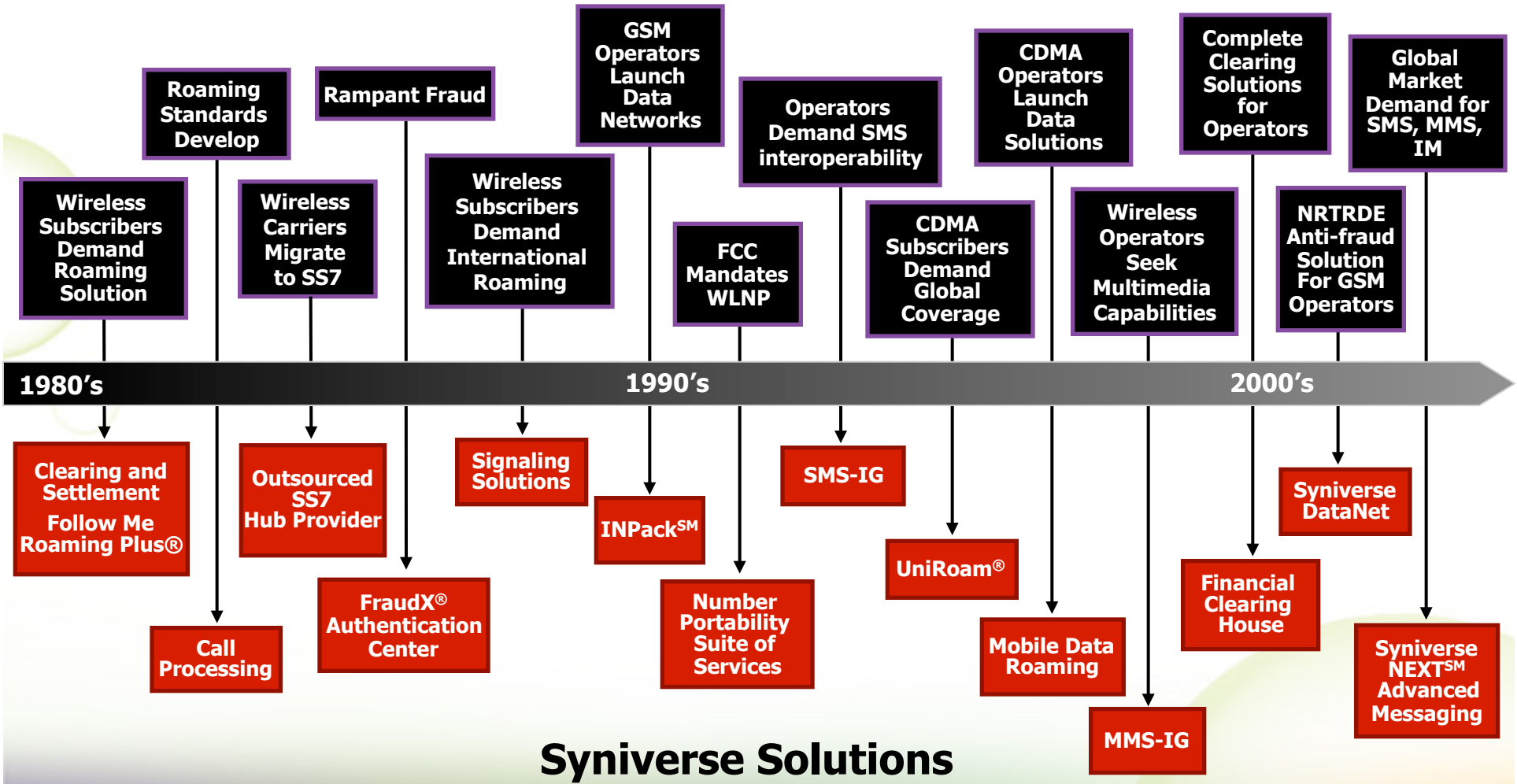
Industry Developments/Issues



Syniverse Solutions

Q & A

Thank You!

Martin Guilfoyle
Vice President – Research & Development
BJ Neal
Chief Network Architect