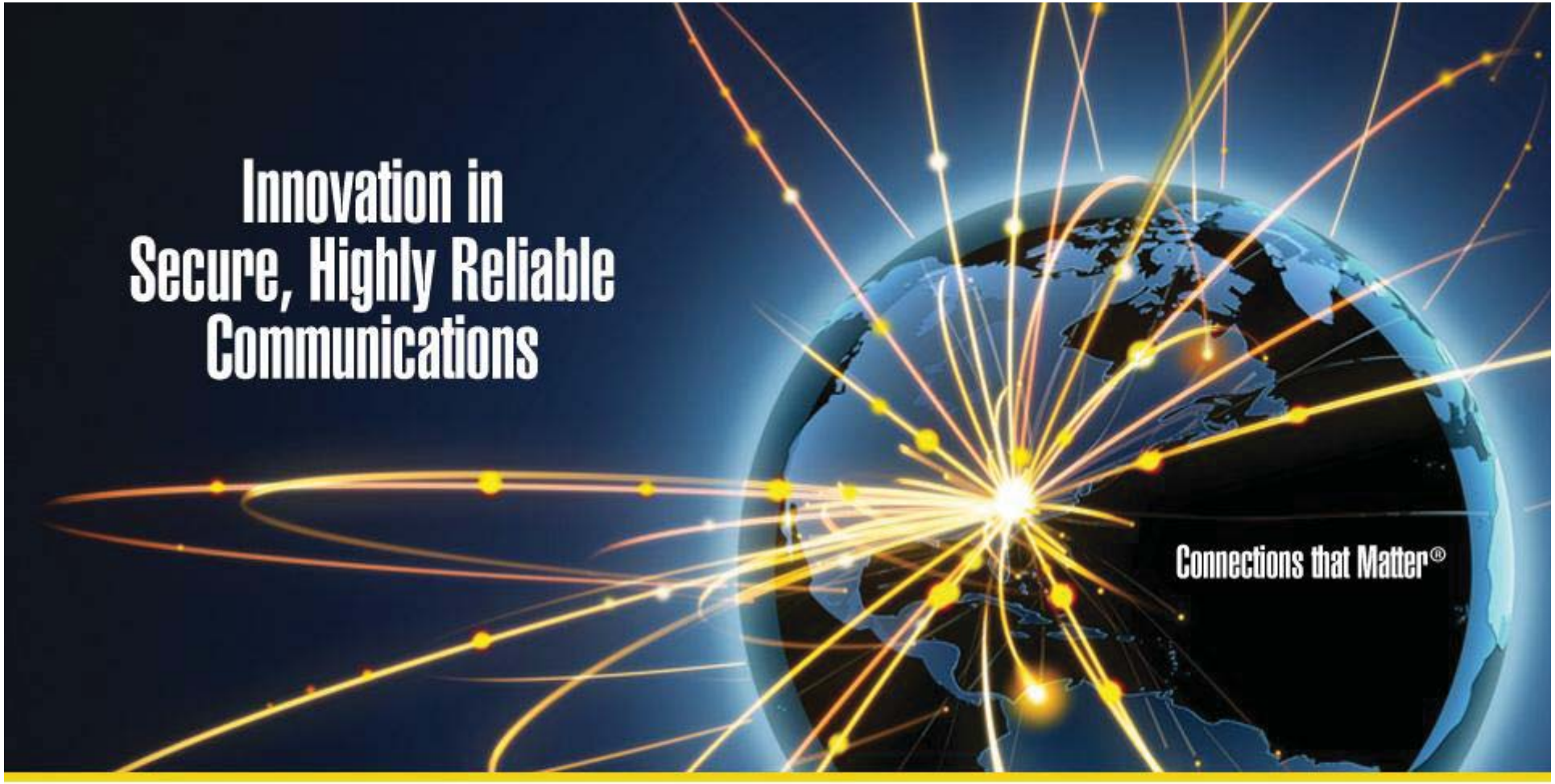

OTT Text to Emergency

December 9, 2013

TCS TeleCommunication Systems
Enabling Convergent Technologies®

Agenda

- Overview of OTT Text ecosystem
- OTT to SMS comparison
- OTT and SMS 9-1-1 standards
- Challenges with OTT text solutions
- Proposed solution

OTT Messaging Statistics

» TCS estimates that OTT messages exceeds carrier-based SMS messages in the US by approximately 142 billion per month versus 92 billion per month

OTT Messaging Providers	Global Users (Millions)	Messages Sent per Month (Billions)	Primary Markets	% US (TCS estimate)	US OTT Messages Sent (Billions per Month)
WhatsApp	350	330	Global	10%	33
Blackberry Messenger	80	300	Global	10%	30
Facebook Messenger	874	300	Global	15%	45
LINE	300	210	Japan, Expanding Global	0%	0
KaKao Talk	100	156	South Korea	0%	0
Apple iMessage	250	60	Global	35%	21
Nimbuzz	150	51	Global	6%	3
Kik Messenger	90	18	North America	50%	9
Viber	200	12	Global	5%	1
WeChat	236	Not Reported	China	0%	0
Google+	300	Not Reported	Global	10%	-
Skype	299	Not Reported	Global	10%	-
Samsung ChatON	100	Not Reported	Global	5%	-
Total OTT	3,329	1,437			142
US SMS Monthly Messages (CTIA)					92

Note: Not meant to be an exhaustive list. Based on reported company data and other reported information

Note: Users are generally reported as active monthly users of the service

Note: LINE, Viber, Samsung and KiK report registered users and not active users

Note: Facebook users are monthly active mobile users

Note: Google+ users are total users of Google+ and not just its messaging service

Note: Skype users are total users of Skype service and not just its messaging service

Note: US SMS messages per month sent based on CTIA's reported 2.2 trillion US SMS messages sent and received in 2012

OTT Text-Centric Apps

Cross-platform

- Google Talk
- WhatsApp
- Viber
- Kakao

Platform-specific

- Apple iMessage
- Facebook Messenger
- Google Huddle
- Blackberry Messenger

Jabber/XMPP based

- Adium
- Beejive IM
- +97 more@

http://xmpp.org/xmpp-software/clients/

Overseas

- WeChat

Forgotten…

- ICQ
- AIM

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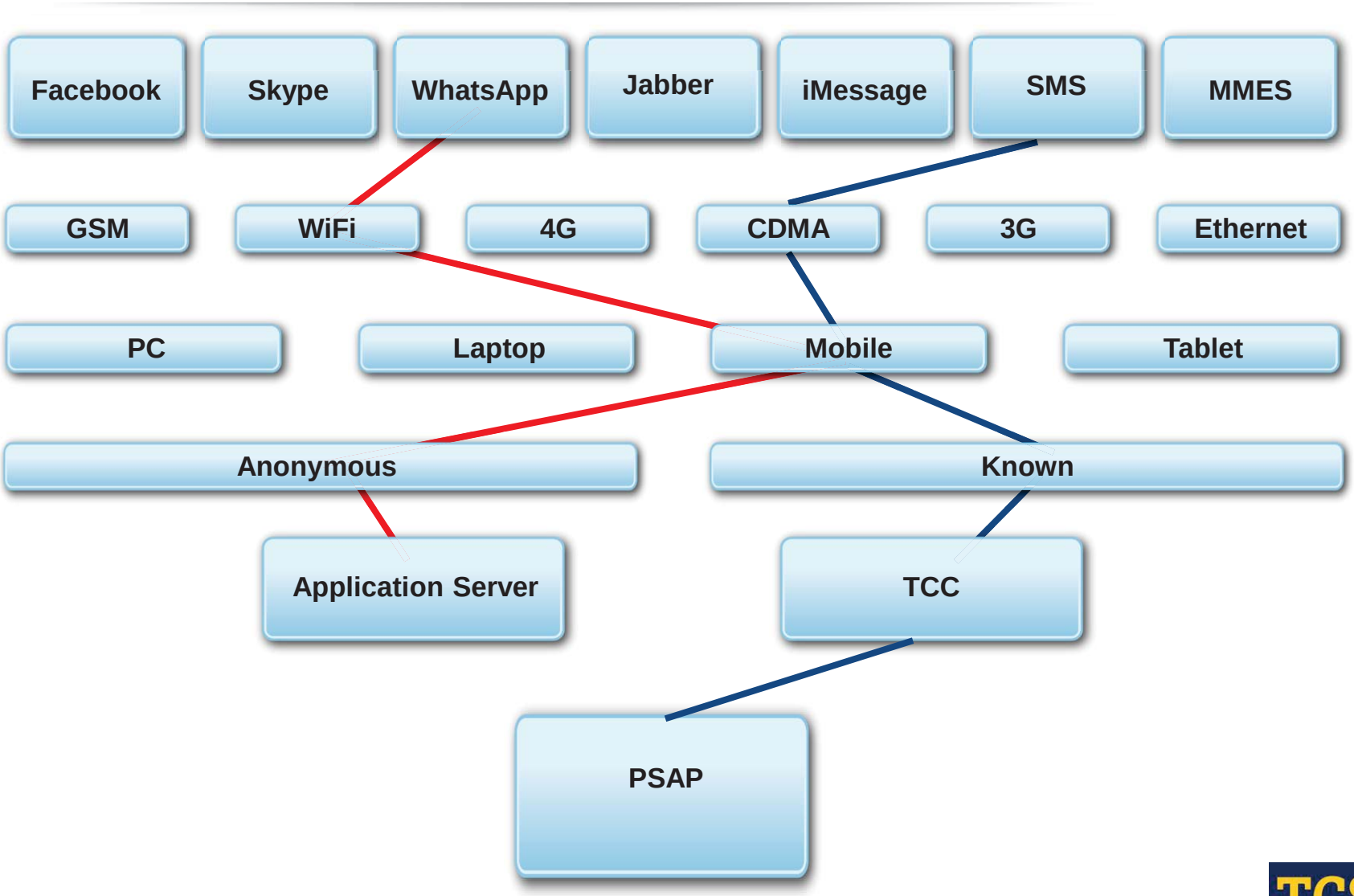
OTT vs. SMS Message Flow for 9-1-1



SMS Compared to OTT

SMS Characteristics

- Multiplatform - covers all handsets in the U.S.
- Not free (per-message or subscription)
- Supports Roaming between carriers
- Consistent UI
- Uses TNs and Short Codes as identifiers
- J-STD-110 Standard
- Doesn’t include MMS, MMES, or Multimedia content

OTT Compared to SMS – Pros/Cons

OTT Characteristics - pros

- Is growing - outpacing SMS for texting applications
- Is fad-like – with “brand” loyalty that is subject to “churn”
- OTT can support Multimedia (Text + Video + Voice)
- Message size is variable not limited to 160 characters per message
- Can perform RTT (Real Time Text)
- Not limited to mobile devices
- Can be tightly integrated into social media sites
- Username style addressing as compared to TN
- Robust user interface

OTT Compared to SMS

OTT Characteristics - cons

- No TN required – callbacks are more difficult
- Immense number of OTT Text apps available
- Standards for emergency use of OTT are non-existent
- Not on all devices
- No ubiquitous nationwide coverage
- Silos - Limited directory services between ASPs
- Network provided location – in some cases is infeasible
- Handset initiated location service access is not guaranteed
- Location acquired may not be trustworthy
- User interfaces vary - different features, protocols
- Security issues - authentication, credentials, vetting
- Requires a data session

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Standards vis-à-vis OTT

- Current standards focus on SMS only
  - Less than half of texting is addressed
- J-Std-110 covers coarse location for routing
- Precise location required if only possible

Should SMS standards be extended to address IP based solutions for Text-to-9-1-1?

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Trustworthiness of OTT

- Account authentication
- End-user profile information
  - For mobile (SMS) end-user is typically vetted
  - For OTT end-user could be anonymous
- Device location for OTT
  - Network location techniques not standardized
  - Device locations could be spoofed
  - No carrier association

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OTT Platform and Location Capability

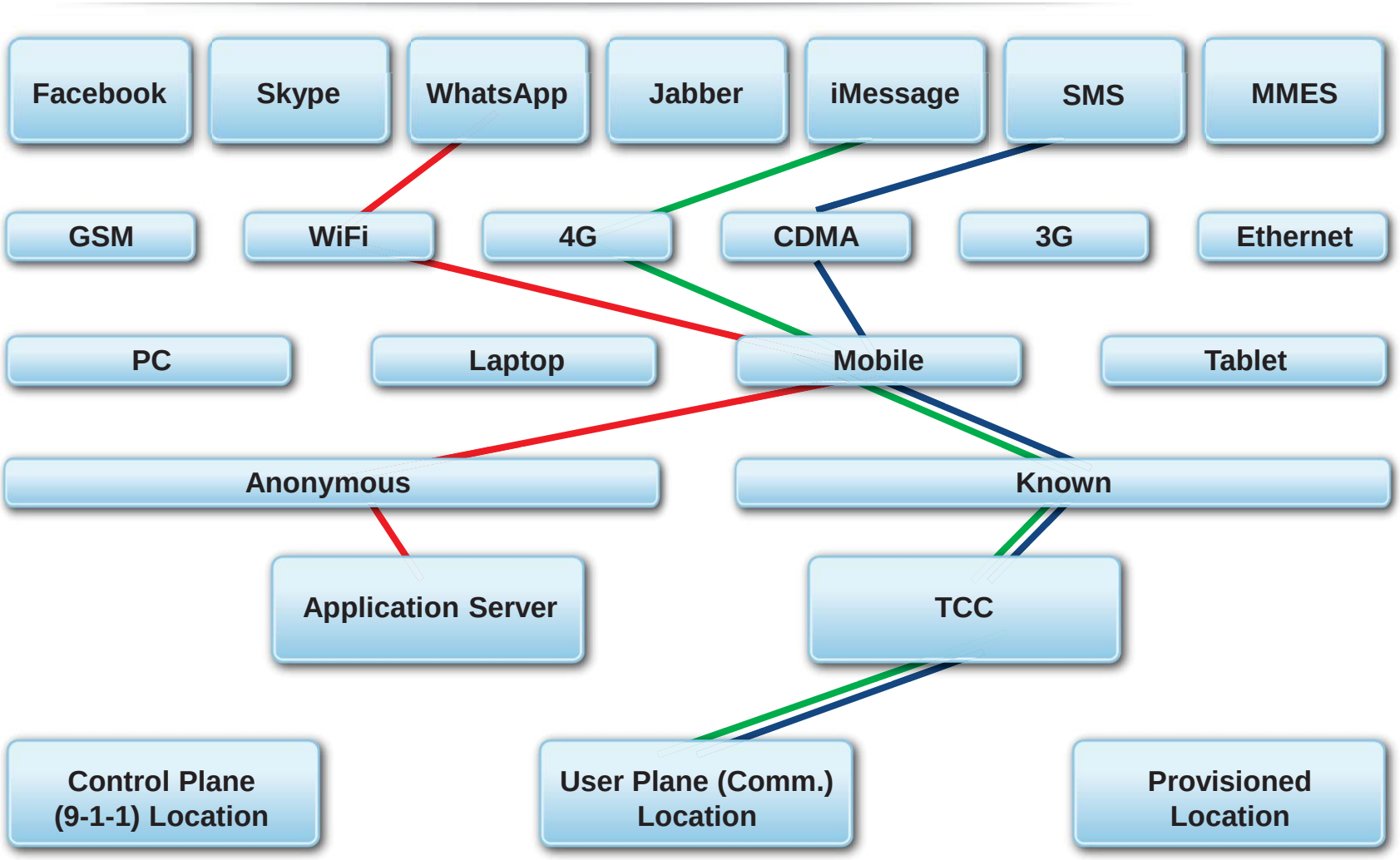
- PCs
- Laptops
- Tablets
- Smartphones

Consider Mobile only

...as a starting point

Note: Typically no support for legacy mobile handsets

OTT Location - The Greatest Challenge



OTT Location Capability

	SMS-capable (OEM/OS)	GPS Autonomous	A-GPS MO/MT	WiFi/ WLAN	Other NFC/BT/etc.
PC	No	No	No	No[2]	No
Laptop	No	No	No	No[2]	Yes
Tablet	No	No[1]	No	No[2]	Yes
Mobile/ Smartphone	Yes	Yes	Yes	No[2]	Yes
Legacy wireless phone	Yes	No	Yes	No	No

[1]GPS chipsets available in some tablets equipped with or without 3G/4G
[2]Requires access to WiFi database with location coordinates (not in 9-1-1 today)

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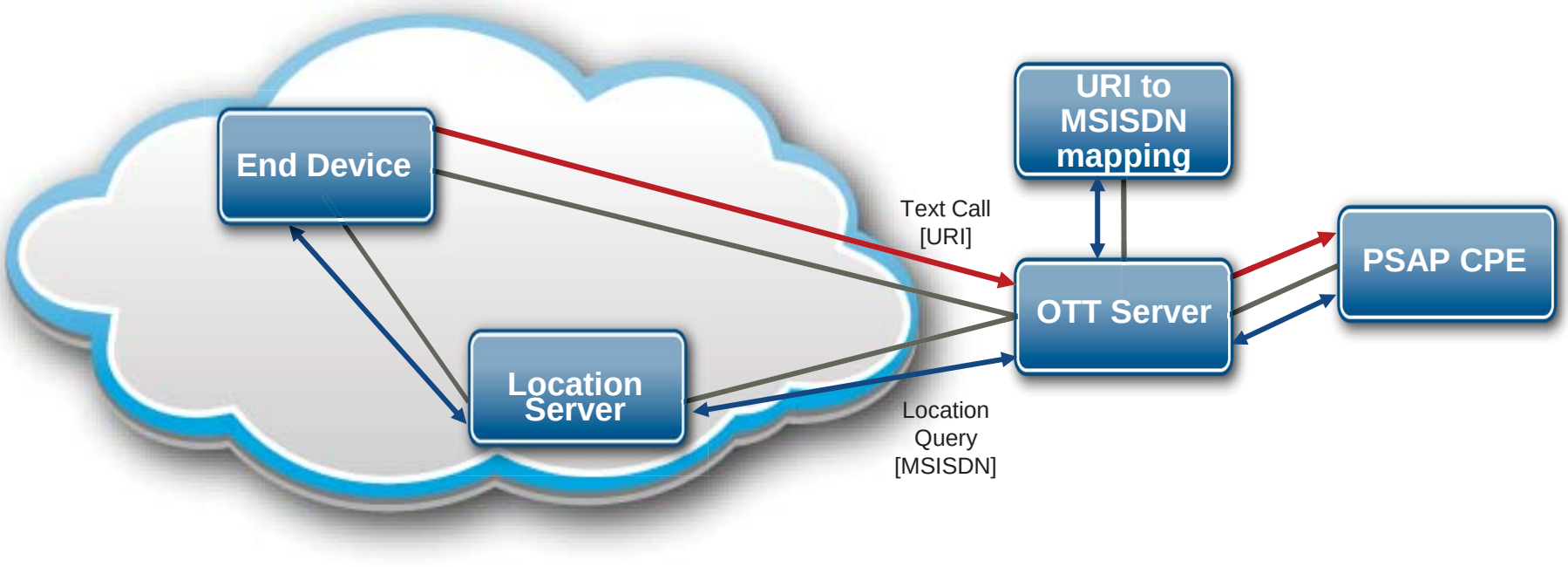
OTT Location Challenges for Mobiles

- Existing E9-1-1 LBS platform limitations
- Location server deployment pre-requisites
- Hardware limitations (e.g., no GPS chipset)
- Handset vs. network based location choices
- OS service layer access (software+firmware)
- Location time-to-fix (coarse vs. precise)
- Location service client configuration (on|off?)

OTT Location Model Needed
(including Mobile Location Platform)



OTT Client Identifier

The key to Location - Summary

- Do OTT text apps have a client identifier that works with a location server?
  - Need MDN/MSISDN (not URI) for location queries, though IP address, Mac may be used
- Does the OTT identifier work for callback?
- OTT user (account) name to MDN mapping could be done within the mobile OS API

Easiest approach is for a standard OS API to support SMS service layer and location services from the OTT app

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OTT Text – Proposed Solution

Mobile SMS API Approach

- Mobile OS (OEM) providers expose SMS API
- OTT Messaging process 9-1-1 thru the SMS API
- SMS API incorporates mobile TN
  - TTY
  - Web services (GEM911™)
  - i3/ESInet
- Reuses all existing SMS911 infrastructure

The SMS API on the device makes texting 9-1-1 transparent to the original UI

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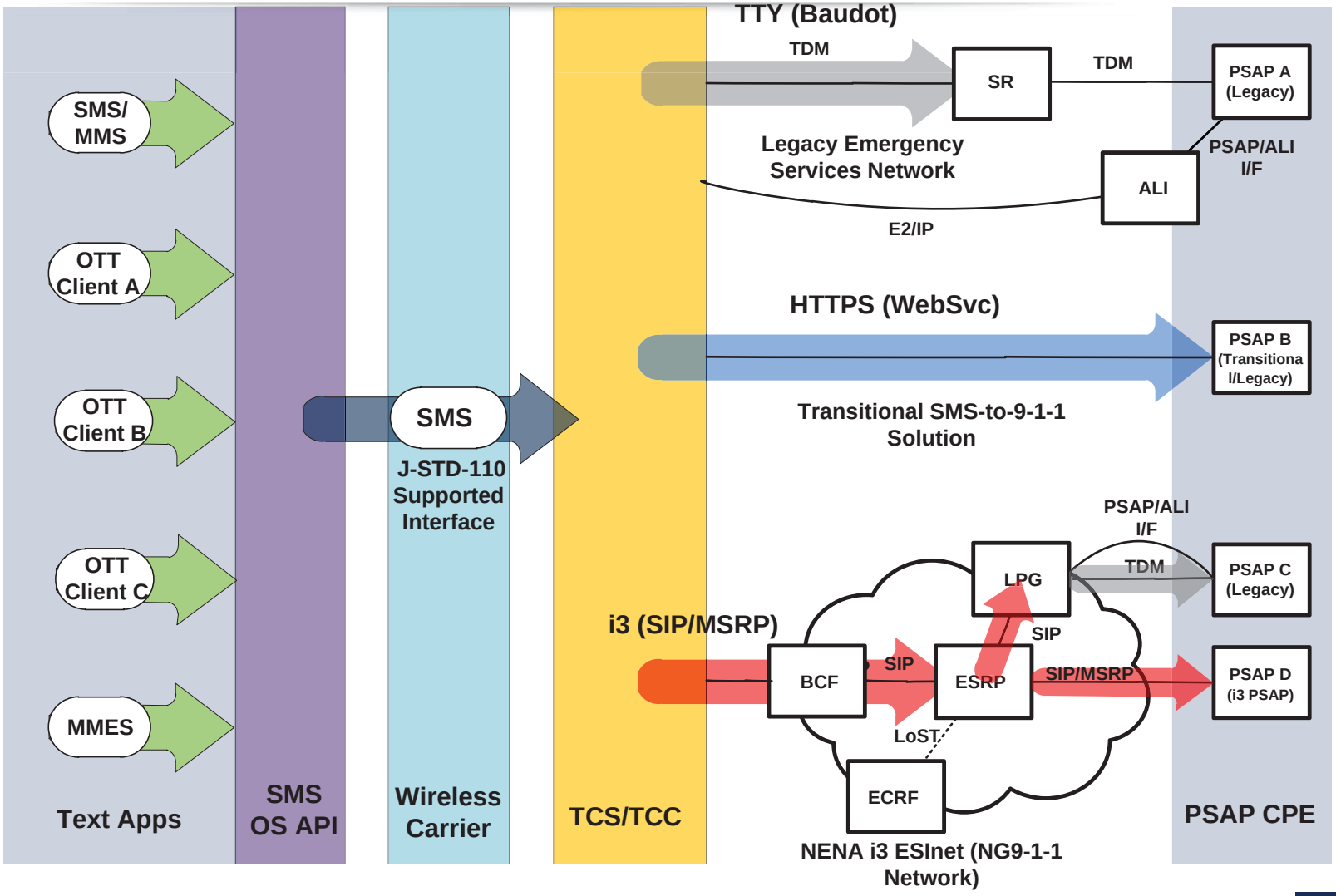
OTT Support through OEM/OS API



OTT Constraints Considered

- Mobile devices with CMRS subscription only
- OTT Text supported via mobile OS SMS API
  - Reuses existing standards (J-STD-110)
  - No change to CMRS Carrier access/core networks
  - Leverages existing TCC infrastructure
  - No change to PSAP interface options (TTY, GEM911, i3)
- Multimedia phasing
  - Text only mode initially
  - Image & Video as a follow-on
  - Voice media last

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Thank you!

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