WAS #9, 2019
WELCOME TO VOLTE & 5G ROAMING ROUNDTABLE

April 8 | Kuala Lumpur, Malaysia
AGENDA – MONDAY APRIL 8, 2019

07:50 – 08:10  Breakfast

08:10 – 08:20  Welcome
                    Session Objective & Agenda
                    Introduction of all participants  Patrick George,
                    EVP Product & Business Development

08:20 – 08:50  VoLTE Roaming key 2018 takeaways
                    Feedback from recent survey
                    Key discussion points  Chris Lennartz,
                    VP Product Management Mobile

08:50 – 09:20  Evolution to 5G
                    Survey feedback
                    Key discussion points  Bill Welch,
                    Product Manager Mobile Innovations

09:20 – 09:30  Conclusions & Wrap-up  Patrick George
Stimulate discussion and information sharing with Mobile operators on VoLTE Roaming and 5G Roaming

A pragmatic and interactive discussion, allowing early adopters to find each other and share their experiences.
ROUNDTABLE INTRODUCTIONS

Please share:

• Name, Title
• Company
## OUR RAPID GROWTH TO LEADERSHIP

### PRIME PARTNERS

**FINANCIAL**

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### PORTFOLIO

**MANAGED SOLUTIONS**

- An end-to-end set of solutions with leading IPX and value added services
- VOICE SOLUTIONS
- MOBILE DATA SOLUTIONS
- IoT CONNECTIVITY SOLUTIONS

- supported by SECURITY SOLUTIONS and BUSINESS INTELLIGENCE

### VOICE LEADERSHIP

**SEPTEMBER 2018**

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**ACQUISITION**

- 9th GLOBAL OPERATOR BY INTERNATIONAL MINUTES
- 14th GLOBAL LEADER ON VOICE AND ROAMING
- 18+ BN VOICE MINUTES
- 30+ BILLION MINUTES

**REMAINS ALTICE PARTNER FOR**

- VOICE and MOBILE DATA

### GLOBAL LEADERSHIP

**FEBRUARY 2019**

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**ACQUISITION**

- 8th LARGEST GLOBAL VOICE PROVIDER
- +18 BN VOICE MINUTES
- TOP 3 IPX
- +660 LTE DESTINATIONS

**REMAINS KPN PARTNER FOR**

- VOICE, ROAMING, MOBILE DATA, TRANSMISSION and IoT

### COMMUNICATIONS LEADERS

**ONE GLOBAL TEAM**

- 3rd LARGEST GLOBAL VOICE PROVIDER
- TOP 3 for 4G connectivity
- USD 1+ BILLION IN REVENUES
- 30+ BILLION MINUTES
- 1000+ CUSTOMERS
- 300 GLOBAL EMPLOYEES
- 18 OFFICES
VOLTE ROAMING
WHAT WE SEE...

Still positive trends from reports and projections

Question In Rocco report – Oct 2018:

What are your key businesses focuses for the coming year and how could IPX support them?

The first two answers are:
“VoLTE” x 61 MNOs
“VoLTE Roaming” x 18 MNOs
ANSWERS FROM OUR SURVEY ARE ALSO OPTIMISTIC...

Q3 Do you have VoLTE deployed?

Answered: 20  Skipped: 1

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Q4 Do you have VoLTE Roaming deployed domestically?

Answered: 20  Skipped: 1

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However, in practice we don’t see International VoLTE take off......
KEY TAKEAWAYS FROM LAST SESSION
Identified issues are still a challenge

**QUALITY:** Shorter call set-up times - High voice quality - Significant improvement of customer experience vs 3G roaming ('CS fall-back')

**HANDSETS:** Different SIP clients on handsets: interoperability issues; low interest of handset manufacturers in fixing reported VoLTE issues.

Greenfield LTE mobile operators disadvantaged by handsets switching to 3G in case of no LTE coverage and remaining on 3G

**ROAMING ARCHITECTURE:** S8HR is preferred model over LBO - Delay of voice calls routed back to home network with S8HR, not perceived as a real issue - Lawful intercept still a challenge with S8HR, solutions in some countries start to surface

**COMMERCIAL DEPLOYMENT** Inbound roaming business opportunities - Cost reduction to the network - Common practice of using various APNs to make price differentiation between data roaming, voice roaming, and other roaming services over LTE - VoLTE interworking an essential part of an ecosystem for VoLTE hub ecosystem

**VOLTE ROAMING PLAN FOR 2018** - Interest for both inbound and outbound roaming - Many expressed their ambition to implement several VoLTE roaming partners - Pending technical issue: how to ensure PLMN connected to all partners and still recognized as preferred
VOLTE KEY QUESTIONS

• What challenges generate this disconnect between reports, surveys and the reality?

• Your biggest challenge which restricts VoLTE roaming growth and why?

• What are the major advances you made in VoLTE in these areas since last meeting:

  **Commercial:**
  - Considering to launch Outbound Volte
  - Pricing plan regarding Discounted IOT
  - Better chance for Inbound roaming
  - Launched VoLTE roaming
  - Finally we got green light to start working on it.

  **Technical/operational:**
  - Lawful Intercept, Emergency call, and etc.
  - Still waiting for lawful intercept solution
  - Employment of device-based steering
  - Easy to manage customer experience
  - VoLTE Inbound operational
  - Negotiate with current IMS provider to resolve bugs
  - SH8R or deciding whether using S8HR or LBO

• Can 2G/3G shutdown as a deadline, be a motivation for deploying international Volte and why?

• How will VoLTE roaming over IPX contribute to the quality of roaming voice calls?

• Are the VoLTE Roaming Charging Model(s) hampering roll out?

• What about RCS in relation to VoLTE - do you still see that as a development priority?

• With 5G/IoT around the corner, will International VoLTE become a lower priority?
THE ROAD TO 5G
WHAT AND WHEN 5G ROAMING

What will 5G Roaming bring?

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<th>REACH</th>
<th>EFFICENCY</th>
<th>LATENCY</th>
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<td>Massive Machine type communications mMTC</td>
<td>Ultra-reliable and low latency communications uRLLC</td>
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<td>Improved consumer experience</td>
<td>e-health</td>
<td>Vehicle-to-everything communication</td>
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<td>More connected devices</td>
<td>Transport &amp; logistics</td>
<td>Drone delivery</td>
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<td>Faster connection speeds</td>
<td>Environmental monitoring</td>
<td>Autonomous delivery</td>
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<td>Virtual and Augmented Reality</td>
<td>Smart energy networks</td>
<td>Smart manufacturing</td>
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When will 5G Roaming get here?

[4G TIMELINES +10 YEARS]

Launched per year
Cumulative

- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018 (Apr)
GROUP SURVEY RESULTS – 5G

5G Deployment Plans

- 5G Deployed
- Within 1 Year
- Within 2 Years
- Unknown

5G Challenges

- Spectrum allocation
- Regulation
- Business case
- Technology partner
- Lack of standards
- Architecture
- Unknown use cases
- Not sure

- Are Spectrum issues resolved with 2/3G shutdowns?
- How are you going about resolving the business case problem? Do limited commercial trials help?
KEY 5G QUESTIONS

• Lots of unanswered problems

• Problem areas – Business case, Not sure, Spectrum, Architecture, Unknown use cases and Lack of Standards
  • Are there other problem areas we should be discussing?

• Is now the right time to tackle the 5G Roaming topic?
  • What does the next 6-12 months look like for you on 5G and 5G roaming?

• Is VoLTE roaming a requirement before 5G Roaming is realized?

• What do you expect from the IPX provider, compared to what we do now?

• Are there (international) 5G use cases and experiments that you can share?
ROCCO SURVEY
ROCCO developed two surveys with guidance from Tier 1 MNOs about what they wanted to understand about 5G and LPWA Roaming and then asked all MNOs to give their view on the questions.

- **5G / LPWA Roaming – Are We Ready? Report 2019**
- 60+ MNOs Responded to the surveys we conducted including for 5G, 32 Tier 1 MNOs in the USA, Japan, China, UK, Germany and major MNO Groups.
Roaming Business case:
The association between the commercial viability of 5G and the growing IoT industry is undeniable.

61% BY 2020 61% EXPECT TO HAVE 5G FOR DOMESTIC

28% BY 2020 28% EXPECT TO HAVE INTERNATIONAL ROAMING

50% OF MNOS CONSIDER ROAMING TO BE A MAJOR FACTOR IN ROLLOUT

72% OF MNOS STATED THEY ARE ALREADY HAVING ROAMING TRIALS
WRAP UP
Agreement on topics for next time

Stay with VoLTE or move on?

- New Topic
- 1 Year
- 1-2 Years
- 2+ Years
- Not sure

No clear answer on if we should move on from VoLTE Roaming topic:

- Continue with VoLTE for one more year and then revisit question at the next session?
- 5G Roaming is the clear favorite for new topic and add 5G Roaming to discussion group?

Next Topic?

- IoT
- 5G Roaming
- Other
Takeaways
Suggestions & Actions
Next Steps
Continue the discussions &
join the LinkedIn group:

https://www.linkedin.com/groups/8675420/
BE THERE FIRST