

Breakfast session

VoLTE & 5G ROAMING
ROUNDTABLE

March 13, 2023 | WAS#17 | Vancouver

BE THERE FIRST

ROUNDTABLE OBJECTIVES

Stimulate interaction and **information sharing** with Mobile operators on VoLTE Roaming and 5G Roaming

A pragmatic and **constructive** discussion, allowing early adopters to find each other and share their experiences and the ecosystem they benefit

ON THE AGENDA

7:30 – 7:45	<i>Breakfast begins</i>	
7:45 – 7:50	<i>Welcome, session objective & Sli.do introduction</i>	<i>Guillaume Klein, Vice President Product Management</i>
7:50 – 8:00	<i>Warm up questions & Market updates</i>	<i>Guillaume Klein, Vice President Product Management</i>
8:00– 8:15	<i>Operator’s experience: Telus VoLTE & 5G</i>	<i>Ahsun Khan, Sr. Design Specialist, CTE – Roaming, Telus</i>
8:15– 8:30	<i>Discussion, Learning from operators’ experiences</i>	<i>Interactive discussion , Q&A</i>
8:30 – 8:40	<i>iBASIS update on 5G SA developments</i>	<i>Maïssa Jamli, Senior Product Manager, iBASIS</i>
8:40 – 8:45	<i>Wrap-up</i>	<i>Guillaume Klein, Vice President Product Management</i>

JOIN THE CONVERSATION

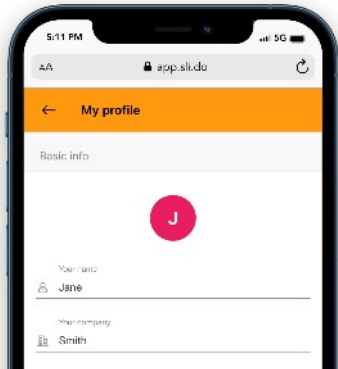
Share your opinions and experiences.

Your responses are key to shaping our discussion.

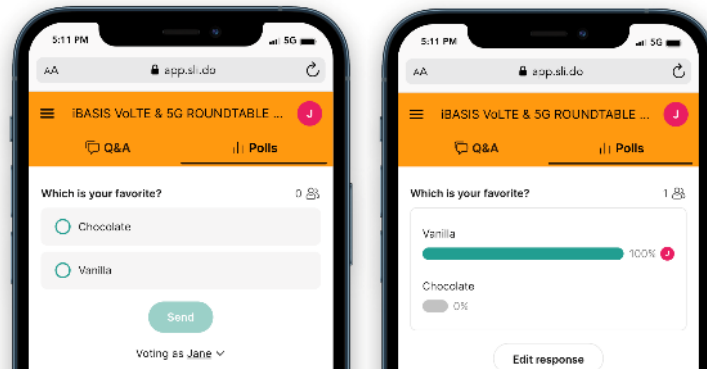
Scan the QR code or go to [Slido.com](https://slido.com) and enter the code **iBASISWAS17**.



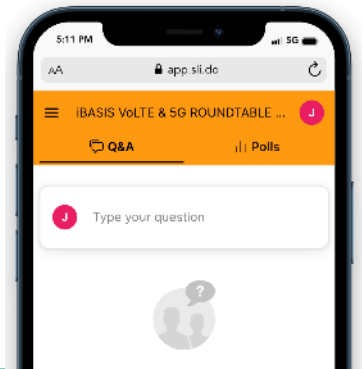
Edit your Profile



Answer polls and see the room's answers!



Submit questions



LET'S TRY THE SLIDO QUESTION



Where did you travel from?



Where did you travel from?

Wordcloud Poll 42 responses 42 participants



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MARKET UPDATE

VoLTE & 5G Roaming status

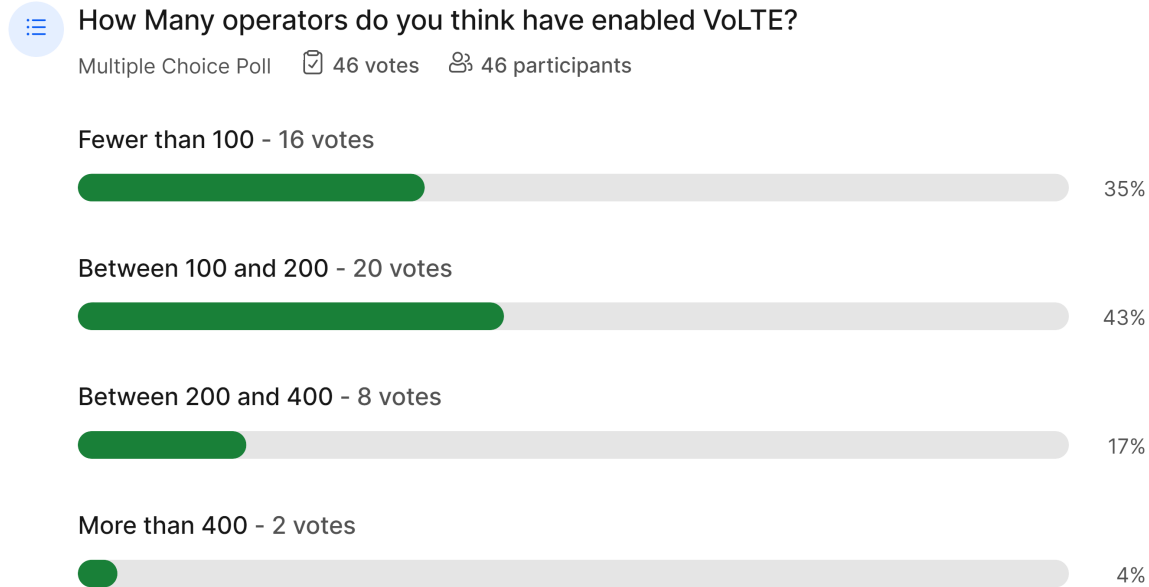
VoLTE WARM-UP QUESTION

How many operators do you think have enabled VoLTE?



- Fewer than 100
- Between 100 and 200
- Between 200 and 400
- More than 400

VoLTE WARM-UP QUESTION



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5G NSA WARM-UP QUESTION

How many operators do you think have launched 5G Non-Standalone (NSA) today?



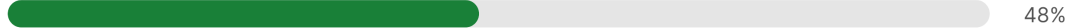
- Fewer than 100
- Between 100 and 200
- Between 200 and 400
- More than 400

5G NSA WARM-UP QUESTION

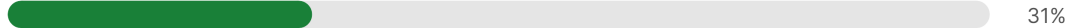
 How many operators do you think have launched 5G Non-Standalone (NSA) today?

Multiple Choice Poll  48 votes  48 participants

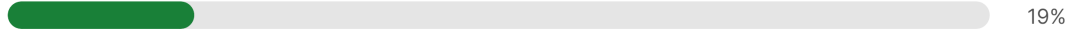
Fewer than 100 - 23 votes



Between 100 and 200 - 15 votes



Between 200 and 400 - 9 votes



More than 400 - 1 vote



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5G SA WARM-UP QUESTION

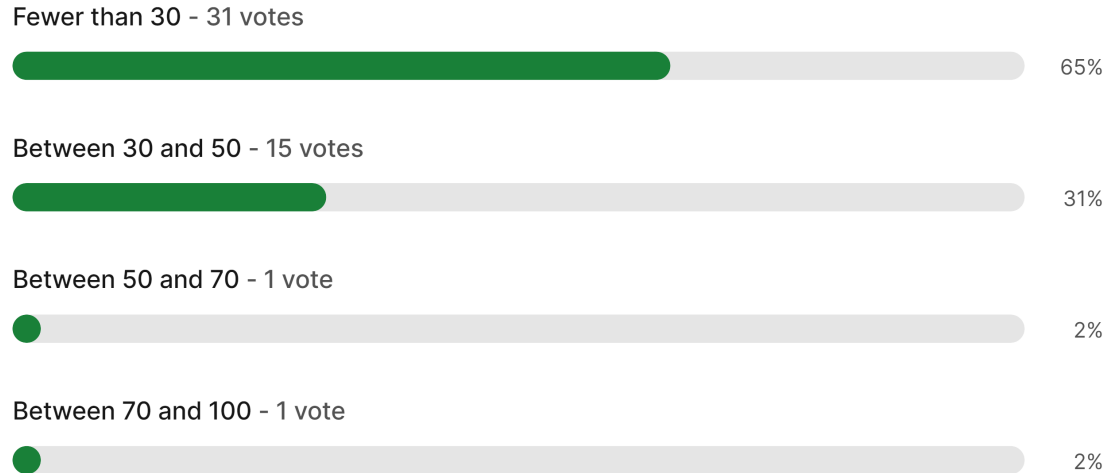
How many operators do you think have launched 5G Standalone (SA) today?



- Fewer than 30
- Between 30 and 50
- Between 50 and 70
- Between 70 and 100

5G SA WARM-UP QUESTION

 How many operators do you think have launched 5G Standalone (SA) today?
Multiple Choice Poll  48 votes  48 participants



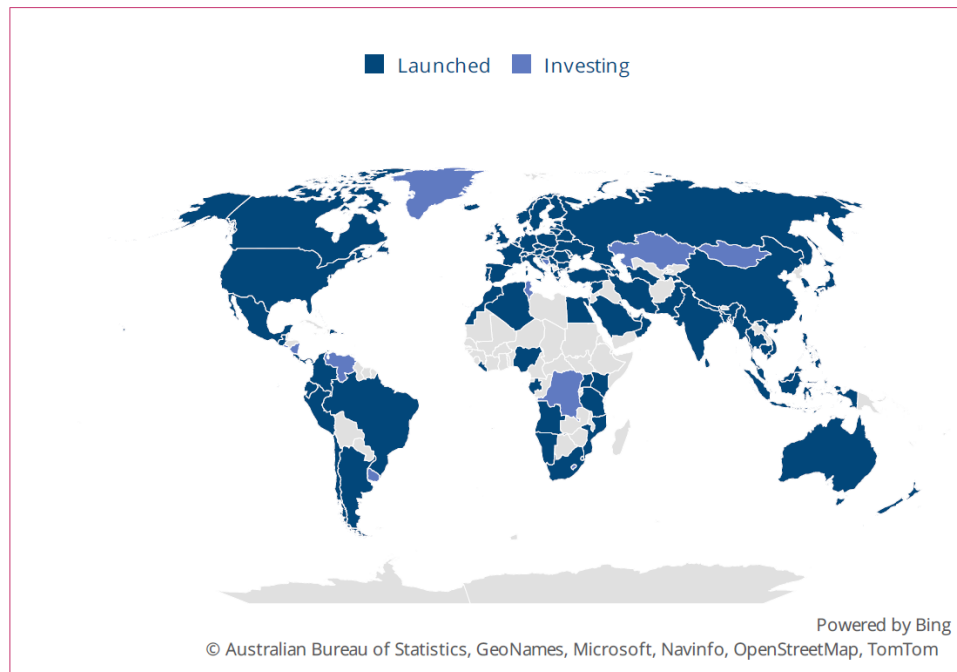
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VoLTE GLOBAL STATUS

- **292 operators** investing in VoLTE in **132 countries** and territories

of which

- **258#** have **launched** or are **currently deploying** commercial VoLTE networks in **118 countries** and territories
- At least 26 additional operators are known to be **planning VoLTE** deployment

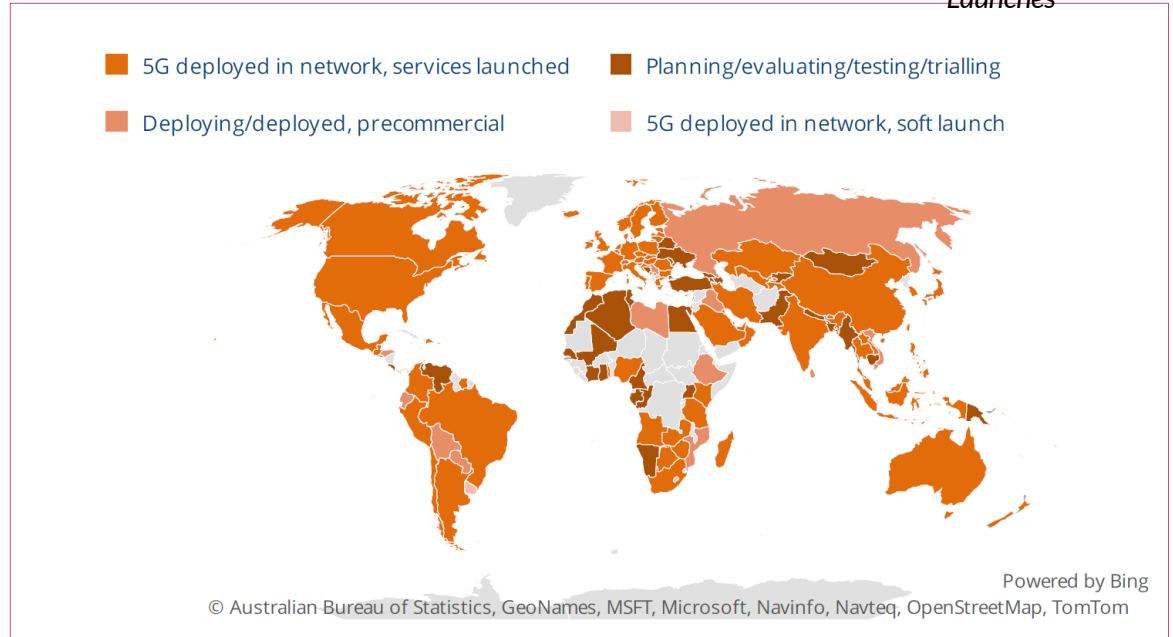


Source, GSA Report Evolution from LTE to 5G, January 2023

5G LAUNCHES OVERALL

- **515 operators** in **155 countries** and territories.
- **231 operators** providing commercial **5G mobile services**
- **1400 devices** commercially available & **more than 1700** announced

Global 5G Network Launches

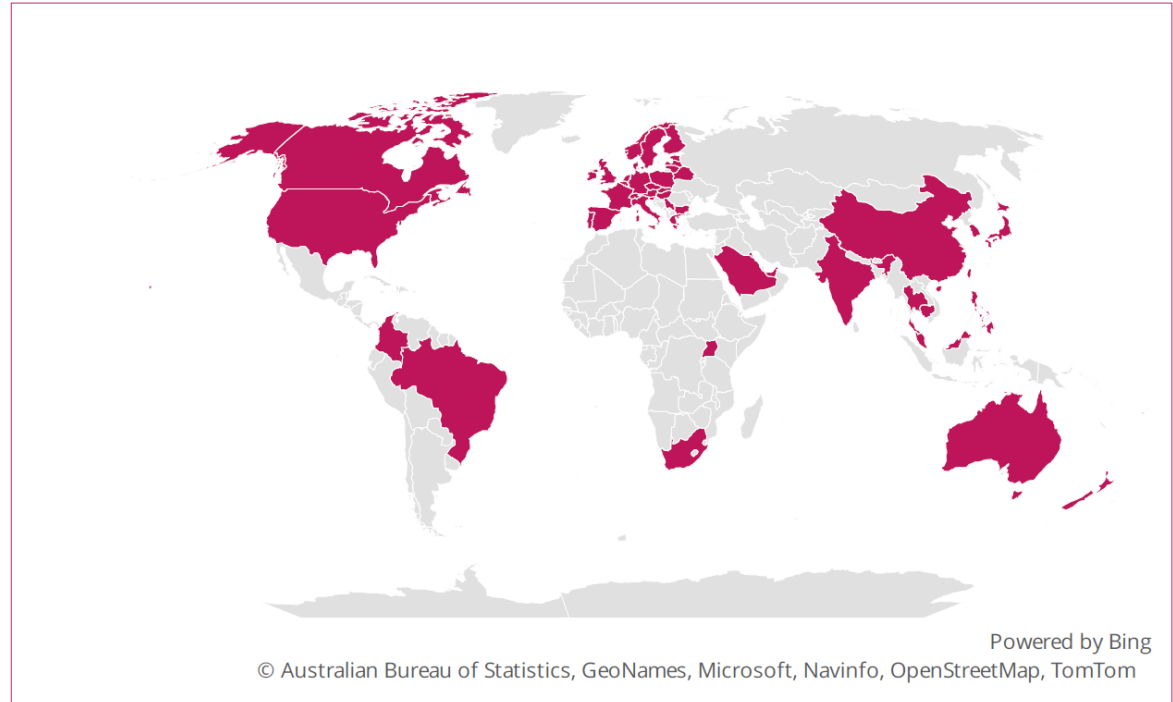


Source, GSA Report Evolution from LTE to 5G, January 2023

5G STANDALONE LAUNCHES

Map of operator investment in 5G Standalone

- 112 operators in 52 countries investing in 5G standalone for public networks
- At least 37 operators in 22 countries have launched public standalone 5G networks.
- 19 other operators in 11 countries announced they are deploying
- Over 1450 devices announced with 5G Standalone support



Source, GSA Report Evolution from LTE to 5G, January 2023

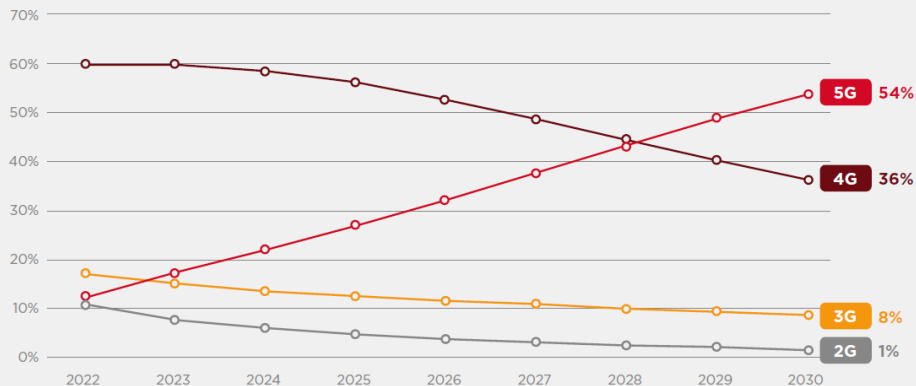
THE TIME DIMENSION OF 5G MARKET PENETRATION

5G will overtake 4G
in **2029** to become
the **dominant**
mobile
technology by the
end of this decade

Figure 3

Mobile adoption by technology

Percentage of total connections



Source, GSMA report, *The Mobile Economy 2023*



OPERATOR EXPERIENCE : TELUS

With VoLTE & 5G Roaming

BE THERE FIRST



VoLTE & 5G Roaming

TELUS

VoLTE Roaming



Current State

- Ramp up VoLTE Roaming launches.
- Emergency Call handling for Inbound Roamers.
- Emphasis on Automation.



Challenges

- Specific enablement on network nodes - for each launch.
- QoE - distinguishing between RAN vs Core/IP transport degradations.
- LI requirements for inbound roamers.

VoLTE Roaming (contd)



Lessons

- Global provisioning of VoLTE roaming may generate unnecessary signaling - Operational headache.
- Disparate tools provide varying results/quality measurements due to different methodologies. Use these for guidance ONLY !!!
- Latency is reality in roaming.. TELUS and our partners realized VoLTE's tolerance for latency ~250 ms.



Best Practices

- Enable VoLTE Roaming specific to launches.
- Multiple avenues of insights. Locally within the network and at IPX.
- Refrain from jumping to notion that higher latency is the cause of poor QoE. Focus on network optimization within your control, home network, IPX and friendly networks.

5G Roaming



Current State

- Steady the course with NSA Roaming launches.
- Network readiness for 5G SA roaming.



Challenges

- Device support - relative to 5G Bands (home vs abroad).
- Unknowns with 5G SA roaming.
 - PRINS vs TLS vs Hybrid
 - VAS solutions
- Vendor readiness for 5G SA roaming.

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YOUR EXPERIENCE

With VoLTE & 5G Roaming

BE THERE FIRST

WHERE DO YOU STAND WITH VoLTE

Have you launched VoLTE Roaming?

- Yes
- Not yet
- Ongoing Implementation

WHERE DO YOU STAND WITH VoLTE



Have you launched VoLTE roaming?

Multiple Choice Poll 47 votes 47 participants

Yes - 40 votes



No - 5 votes



Ongoing Implementation - 2 votes



WHERE DO YOU STAND WITH 5G NSA

Have you launched 5G NSA Roaming?

- Yes
- Not yet
- Ongoing Implementation

WHERE DO YOU STAND WITH 5G NSA



Have you launched VoLTE roaming?

Multiple Choice Poll 47 votes 47 participants

Yes - 40 votes



No - 5 votes



Ongoing Implementation - 2 votes



HOW ABOUT 5G SA?

What is your roadmap for 5G SA rollout?

- Investigating
- Launched
- Too early

HOW ABOUT 5G SA?



What is your roadmap for 5G SA rollout?

Multiple Choice Poll 41 votes 41 participants

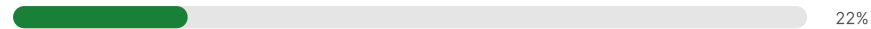
Already launched - 7 votes



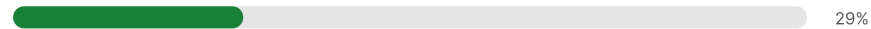
Ongoing launch - 4 votes



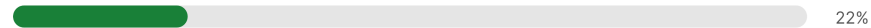
Planned rollout - 9 votes



Investigating - 12 votes



Not on the roadmap for now - 9 votes



Never - 0 votes



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IBASIS EXPERIENCE

5G Standalone Trials

BE THERE FIRST



TEST & LEARN

- Understand 5 SA Roaming Architecture & Functions
- 5G SA Roaming connectivity requirements & procedures



EVALUATE

- Different Roaming connectivity scenarios & their impact
- 5G signaling equipment capabilities & performance



ANTICIPATE

- Technical and operational challenges (interworking, vendors compatibility & readiness)
- More informed decisions for Production roll-out

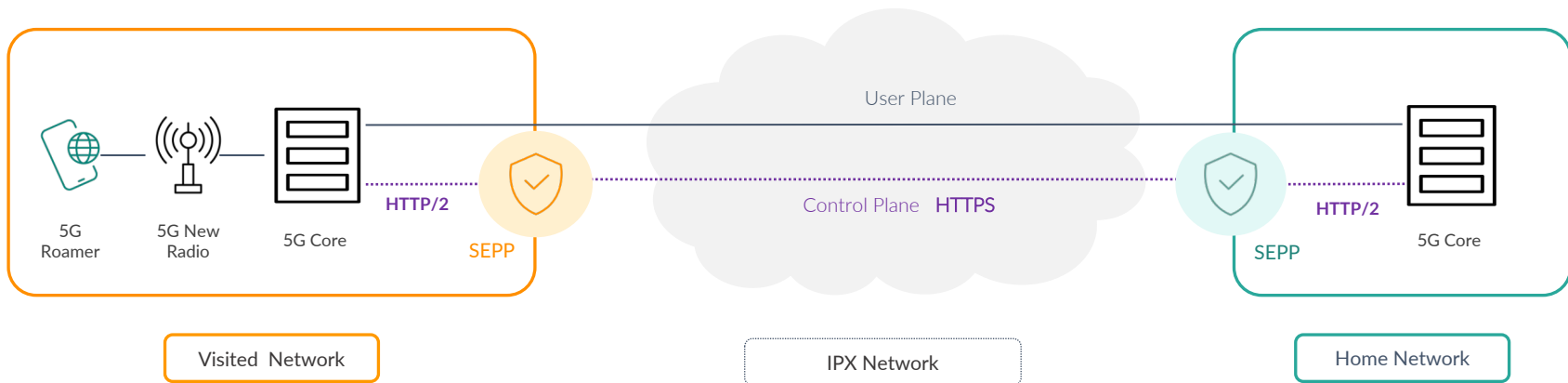
EXPECTATION

Devices roaming in the **5G SA** networks of the two to the Sandbox connected **MNOs** connected to the sandbox and the devices being **able** to make **successful roaming data sessions** and ultimately **Voice call** sessions.

REALITY

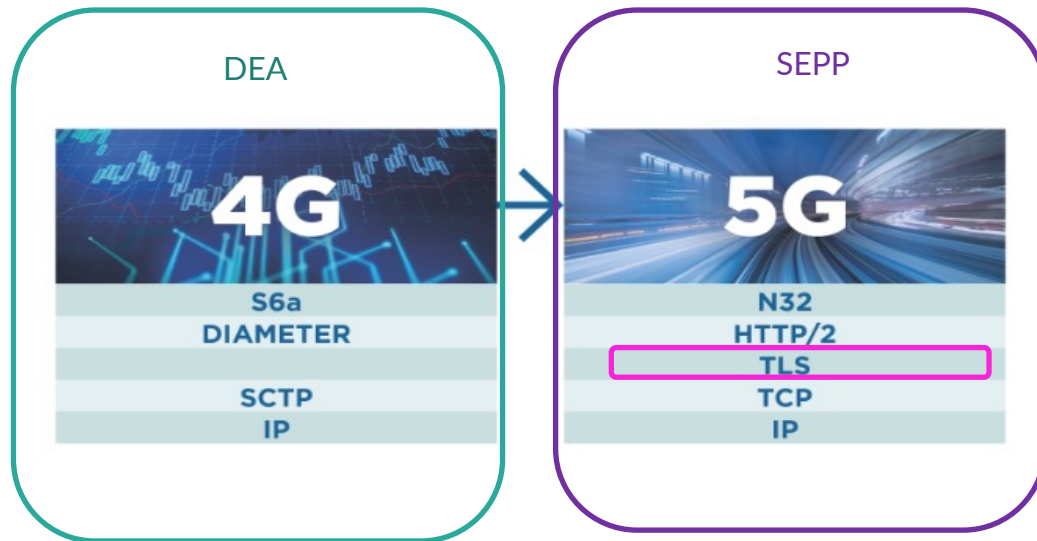
Several months **troubleshooting** the **signaling** & control plane procedures

5G STANDALONE ROAMING INTRODUCES NEW SIGNALING PROTOCOL & NEW SIGNALING AGENT



- A new Signaling exchange Protocol : http/2
- A new Signaling exchange agent : SEPP (Security Edge Protection Proxy)
- Signaling messages are encrypted between Visited & Home Network

5G STANDALONE
 ROAMING
 INTRODUCES A
 NEW
ENCRYPTION
 LAYER WITHIN THE
SIGNALING
 STACK



CHALLENGES

- Difficulties Working with new protocols and new procedures
- Handshake & certificate issues (upload, exchanges, validation, need alignment)
- Once TLS established it is challenging to troubleshoot the N32 interface if not functioning

LEARNINGS

- 5G SA core interoperability & readiness for roaming
- SEPP design and flexibility
- Configuration of test networks of Mobile Operators
- Vendor incompatibility for SEPP and 5G core taking time more time than expected
- TLS connection Lifetime 30 seconds
- Certificates Management (lifetime & renewal)

PHASE 0:
SEPP VALIDATION

- General SEPP functionality (in MNO domain or hosted) **Certificate procedure Handshake**

PHASE 1:
REGISTRATION RELATED TESTING

(involves a second MNO)

- Successful/unsuccessful security capability negotiation (TLS)
- Tear down N32-f
- **Registration of roaming device**
- De-Registration by device and/or by network initiated from UDM
- Registration update

PHASE 2:
SESSION RELATED TESTING

(involves a second MNO)

- **Generate data session as LBO** and/or HR
- Session modification by device or network
- Session release by device or network
- Verify of possibility of message modification in the IPX SEPP/proxy



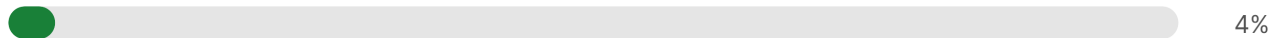
What does the handshake procedure mean in 5G SA roaming?

Multiple Choice Poll 26 votes 26 participants

A gesture of appreciation you perform after signing a 5G SA roaming agreement - 3 votes



The Access Mobility Management function (AMF) and the Unified Data Management function (UDM) negotiating parameters - 1 vote



Two SEPPs establishing a secure connection and exchanging certificates - 22 votes



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- Get your **5G Core** and **SEPP vendor** involved from the **beginning**
- Understand well your **SEPP design** and behavior
- Understand your **counter party configuration**
- Have **5G SA** enabled **SIM & 5G SA roaming** enabled device
- **5G Core** vendor ready to **handle roaming**
- Define a **trial scope** and test-book
- Make sure your device is supporting the **frequency** range of your **counter party** and vice versa



AND WHEN **READY**
JOIN **IBASIS**
5G SANDBOX ;)

CONTACT:
mjamli@ibasis.net



CONCLUSIONS & WRAP-UP

Key takeaways

Recommendations

Suggestions for next meeting

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THANK YOU

ENJOY WAS#17

BE THERE FIRST