#10 Why device connectivity depends on network settings

Tuesday 11 July
14:00 – 15:00 BST
<table>
<thead>
<tr>
<th>Time</th>
<th>Segment</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:00</td>
<td>Welcome and housekeeping</td>
<td>Nicolás Forster GSMA</td>
</tr>
<tr>
<td>14:05</td>
<td>Networks and Devices market update: key trends and drivers</td>
<td>Pablo Iacopino GSMA Intelligence</td>
</tr>
<tr>
<td>14:15</td>
<td>GSMA Network Settings Exchange: GSMA NSX updates and how they can help your business</td>
<td>Shamit Bhat GSMA</td>
</tr>
<tr>
<td>14:25</td>
<td>Why MNOs benefit from Network Settings Exchange</td>
<td>Florian-Leon Schmitt Deutsche Telekom</td>
</tr>
<tr>
<td>14:35</td>
<td>How Mobile Network Virtual Operator Enablers (MVNOEs) and MVNOs benefit from GSMA’s Network Settings Exchange</td>
<td>Kevin Haddad Ztar Mobile</td>
</tr>
<tr>
<td>14:45 – 15.00</td>
<td>Q&amp;A and closing remarks</td>
<td>Nicolás Forster GSMA</td>
</tr>
</tbody>
</table>
Mobile industry is transforming faster than ever before
Growth and evolution of mobile devices and networks are at the heart

- Handsets
- Tablets and laptops
- Consumer IoT devices
- XR devices
- 5G FWA CPE
- Connected vehicles
- Enterprise IoT devices and machines

Proliferation of connected devices

New networks and capabilities
- 5G mobile networks
- 5G FWA networks
- IoT networks
- Private networks
- Network sunsets (2G, 3G)
- VoLTE and Vo5G
- ViLTE and Vi5G
- eSIM and iSIM
- Satellite

Network settings are essential to help OEMs, MNOs and MVNOs deliver a fast, complete and seamless user experience
Consumers going digital is a major force driving change
Network settings ensure consumers get the most from digital services

**Consumer interest in adding non-connectivity offerings to their mobile subscriptions**

<table>
<thead>
<tr>
<th>Service</th>
<th>5G users</th>
<th>Difference compared to 4G users (pp)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Content</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video streaming</td>
<td>62%</td>
<td>+17</td>
</tr>
<tr>
<td>Music streaming</td>
<td>56%</td>
<td>+15</td>
</tr>
<tr>
<td>Live sports</td>
<td>39%</td>
<td>+14</td>
</tr>
<tr>
<td>Gaming</td>
<td>39%</td>
<td>+16</td>
</tr>
<tr>
<td>Cloud storage</td>
<td>56%</td>
<td>+14</td>
</tr>
<tr>
<td>Digital security</td>
<td>55%</td>
<td>+13</td>
</tr>
<tr>
<td>Wearables</td>
<td>52%</td>
<td>+17</td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smart home</td>
<td>46%</td>
<td>+15</td>
</tr>
<tr>
<td>Entertainment</td>
<td>44%</td>
<td>+18</td>
</tr>
</tbody>
</table>

**Key findings from our global consumer survey**

- **Bundling**: 5G subscribers are more interested in adding non-connectivity offerings to their mobile subscription contracts
- **Content**: 5G subscribers make greater use of digital entertainment services (e.g. video, gaming) on their smartphones

Source: GSMA Intelligence Consumers in Focus Survey. Aggregate figures for the eight markets analysed (China, France, Germany, Italy, Japan, South Korea, UK and USA).
5G commercialisation keeps growing
5G is now a global trend

As of 31st March 2023

- **Operators have launched mobile 5G services**: 228 countries
- **Operators have announced plans to launch mobile 5G services**: 62 countries
- **Operators in total across 113 countries worldwide**: 290 countries

**Live commercial 5G network**
- **North America**: Canada, US
- **Europe**: Albania, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK
- **Latin America**: Argentina, Aruba, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Guyana, Mexico, Peru, Puerto Rico, Suriname, Trinidad and Tobago, Uruguay, Virgin Islands, US
- **Sub-Saharan Africa**: Angola, Benin, Botswana, Côte d’Ivoire, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Mauritius
- **CIS**: Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan
- **MENA**: Bahrain, Iran, Israel, Jordan, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Tunisia, Türkiye, UAE
- **Asia Pacific**: Australia, Bangladesh, Bhutan, Cambodia, China, Guam, Hong Kong, India, Indonesia, Japan, Laos, Macao, Malaysia, Maldives, Myanmar, Nepal, New Zealand, Northern Mariana Islands, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, Thailand, Vietnam

Source: GSMA Intelligence.
Global 5G connections

Major industry milestone in 2022: 1 billion 5G connections

5G adoption is faster than that of previous networks
Scaling beyond the first 1 billion

5G share of mobile connections

Source: GSMA Intelligence. * Excluding 5G FWA connections and 5G IoT cellular connections.
The arrival of 5G has accelerated network sunsets
3G shutdowns are more popular than 2G shutdowns

2G and 3G network sunsets (globally)

Completed and planned sunsets, by region (2015–2025)

Source: GSMA Intelligence.
5G and network sunsets are driving VoLTE/Vo5G up
Voice and video going over 4G and 5G

Number of countries providing VoLTE service (including Vo5G) – Globally

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>120</td>
</tr>
<tr>
<td>2025</td>
<td>151</td>
</tr>
<tr>
<td>2028</td>
<td>174</td>
</tr>
</tbody>
</table>

Number of MNOs providing VoLTE service (including Vo5G) – Globally

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of MNOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>299</td>
</tr>
<tr>
<td>2025</td>
<td>386</td>
</tr>
<tr>
<td>2028</td>
<td>478</td>
</tr>
</tbody>
</table>

Number of VoLTE connections (including Vo5G) – Globally, billion

<table>
<thead>
<tr>
<th>Year</th>
<th>VoLTE Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>3.7</td>
</tr>
<tr>
<td>2025</td>
<td>5.3</td>
</tr>
<tr>
<td>2028</td>
<td>6.4</td>
</tr>
</tbody>
</table>

VoLTE connections as % of 4G+5G connections

- 2022: 62%
- 2025: 70%
- 2028: 76%

Source: GSMA Intelligence.
eSIM is now mainstream...and global
Momentum is accelerating: eSIM-only smartphones a major milestone

Commercial availability of eSIM service for smartphones

Number of mobile service providers (MNOs and MVNOs) offering commercial eSIM service for smartphones

Source: GSMA Intelligence.

eSIM-only effect: eSIM commercialisation has accelerated after the launch of eSIM-only iPhones in the US in Sept. 2022
eSIM adoption in the smartphone market: forecast to 2030
The march towards mainstream

Key milestones: Baseline scenario (globally)

- **1 billion** eSIM smartphone connections by 2025
- By 2028, **half** of smartphone connections will use eSIM
- North America will be leading by far (eSIM-only effect). Europe follows

Source: GSMA Intelligence.
Global IoT connections

Billion, globally

- **Enterprise driving IoT growth**: across all vertical sectors
- **Consumer trends**: smart home drives growth. Smartwatches overtaking fitness trackers
- **Cellular on the rise**: nearly 6 billion licensed cellular IoT connections by 2030

Source: GSMA Intelligence.
Momentum for private networks is accelerating
Boosting the number of networks and devices

Enterprise demands for Private Networks

22% of enterprises deploying or planning to deploy IoT solutions require location-specific network coverage (i.e. a factory or campus)

of which 88% have invested or are likely to invest in a private network for that location

Trends in Private Networks deployments

• Network vendors and operators are the main contractors so far…but new players are emerging

• 4G was the leading network tech in the early days; 5G is now taking the lead

• Industrial sectors lead…but there are deployments in all sectors of the economy

Source: GSMA Intelligence Global Enterprise Survey (~2800 enterprises across most vertical industries in 18 countries).
About GSMA Intelligence

info@gsmaintelligence.com
The world’s only device network settings platform

One location where operators and MVNOs update the device manufacturing community with the latest device network settings, so a device can be fine-tuned to a specific network, enabling all services to run reliably, worldwide.
How it works

MNOs and MVNOs

Upload new / amend existing device network settings file

Network Settings Exchange

Receive notifications and download files

Settings pushed to new and current devices, especially OEM devices

OEM and Chipset Manufacturers

© GSMA 2023
+634 OEMs signed up

30% of OEMs have downloaded a settings file in the past 12 months

+746 OEMs download settings files p/m on average

+140 MNO and MVNO accounts

+170 unique network settings featured
New features/ settings process

Contribution process:

1. **Submit Idea**
   - Contributor submits an idea through the GSMA Network Settings Exchange.
   - The idea should be submitted in a clear and concise manner.
   - Include all necessary details such as title, description, potential benefits, and impact on usability.

2. **Complete Idea Submission Sheet**
   - Contributors complete the submission sheet and share it with nsx@gsm.com.

3. **Ideas Analysis**
   - Ideas are analyzed and added to the product backlog.
   - Prioritization is done through the TSG (Technical Specifications Group).

4. **Implementation**
   - New features and/or TS.32 Settings are implemented in NSX based on the release plan, GSMA budget, and agreed priorities.

5. **Prioritization**
   - GSMA Product prioritizes the ideas through the TSG mechanism.

New Features and/or TS.32 Settings are implemented in NSX based on the release plan, GSMA budget, and agreed priorities.
GSMA Network Settings Exchange
Planned enhancements

**In Planning 2023**
- TS.32 v13 (new 5G settings) – Planned Q4 2023
- APN settings process updates
- OEM and MNO messaging – sharing OEM release info with MNO

**On Product Roadmap**
- UI/ UX Enhancements – to be prioritized
  - Usability improvements
  - GSMA branding/ design changes
- Automated ingestion of settings files into OEM systems – TBD in TSG
BACKGROUND / RECAP

2016
- **TS.32**: Technical Adaptation of Devices through Late Customization V1.0
  - PRD defining a set of Network related Settings in Devices, (IMS, APN, 2G/3G/4G/5G, Others)
  - Work on TS.32 is still ongoing, currently in V12.0. (2023)
- **TS.36**: Devices Setting Database
  - PRD defining requirements & functions of a “Device Settings Database”
  - a platform to share TS.32 settings among MNOs & OEMs - Designed by MNOs & OEMs
  - TS.36 was used for reference, and archived after NSX launched

2019
- GSMA develops and launches Network Settings Exchange (NSX)
  - Actively maintained and developed by GSMA. Growing in usage ever since (~630 OEMs / 140 MNOs)
DT PARTICIPATION

- DT uses service to share all 15 separate network settings documents
  - 12 MNOs & 3 MVNOs
  - Since launch 2019, more than 1.500 downloads accumulated
  - Incoming queries from OEMs & Chipset manufacturers

- Target: OEMs & devices outside of DT portfolio
  - Most of the ~600 OEMs have no bilateral relation with DT at all
  - Used to be blind-spot for our Terminals-Team

- DT active in TSG driving NSX & TS.32 forward ever since
<table>
<thead>
<tr>
<th>S.No</th>
<th>File Name</th>
<th>Total Number of times OEIs Downloaded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TS.32 v9.1 Magenta Telekom Austria_232_03_01_220519.xlsx</td>
<td>62</td>
</tr>
<tr>
<td>2</td>
<td>TS.32 v9.1 T-Mobile Netherlands_204_16_1_220518.xlsx</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>TS.32 v9.1 Tele2 NL (MVNO T-Mobile Netherlands)_220519.xlsx</td>
<td>62</td>
</tr>
<tr>
<td>4</td>
<td>TS.32 v9.1 T-Mobile Polska_260_02_1_220519.xlsx</td>
<td>64</td>
</tr>
<tr>
<td>5</td>
<td>TS.32 v9.1 Slovak Telekom_231_02_1_220519.xlsx</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>TS.32 v9.1 Telekom Romania_226_03_06_1_220519.xlsx</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>TS.32 v9.1 Telekom Deutschland_262_1_1_220519.xlsx</td>
<td>57</td>
</tr>
<tr>
<td>8</td>
<td>TS.32 v9.1 Congstar (MVNO Telekom Deutschland)_262_1_1_220519.xlsx</td>
<td>59</td>
</tr>
<tr>
<td>9</td>
<td>TS.32 v9.1 T-Mobile Czech Republic_230_01_1_220518.xlsx</td>
<td>56</td>
</tr>
<tr>
<td>10</td>
<td>TS.32 v9.1 COSMOTE Greece_202_01_1_220519.xlsx</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>TS.32 v9.1 Hrvatski Telekom_210_01_1_220519.xlsx</td>
<td>56</td>
</tr>
<tr>
<td>12</td>
<td>TS.32 v9.1 Magyar Telekom_216_30_1_220519.xlsx</td>
<td>56</td>
</tr>
<tr>
<td>13</td>
<td>TS.32 v9.1 Makedonski Telekom_296_01_1_220519.xlsx</td>
<td>57</td>
</tr>
<tr>
<td>14</td>
<td>TS.32 v9.1 Crnogorski Telekom Podgorica_297_02_1_220519.xlsx</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>TS.32 v9.1 Bonbon (MVNO Hrvatski Telekom)_219_01_1_220519.xlsx</td>
<td>63</td>
</tr>
</tbody>
</table>
OUTLOOK & CALL TO ACTION

▪ New work-mode to jointly work on NSX features in future, with OEMs, MNOs & GSMA

▪ Starting July 13th

▪ DT expects increasing maturity, more features and wider relevance of NSX

▪ Hoping for more OEMs and MNOs to join the service and the discussion in TSG
Privately held Ztar Mobile is a leading US enabler of private label mobile service and private label wireless solutions.

We’re a company of go-getters and builders. We’re innovating the way people and businesses buy wireless. We bring over 20 years of global mobile solution experience to every partnership, enabling our clients to create and deliver intuitively seamless mobile experiences for their customers from private label cell phone programs, m-commerce to IoT services to name a few.

We have launched numerous private label brands for our retail partners.

Ztar Mobile partners with leading wireless operators including AT&T, T-Mobile, Rogers Wireless, and device manufacturers and distributors in its operating markets. These partnerships allow Ztar Mobile to deliver complete outsourced wireless solutions, from service creation to billing and customer care as well as a wide range of Managed Services and Professional Services.
Experience is the Strategy

Frictionless Experiences in World of Disruptions

- Nearly 80% of American consumers point to speed, convenience, knowledgeable help and friendly service as the most important elements of a positive customer experience.
- We consistently need to provide our customers an exceptional value, minimum friction or stress to on-board and activate our customers. We won’t have many chances to get it right.
- With multi-network configurations and independently sourced devices, consumers still expect their device to perform without issue and without manual intervention.
- Consumers would walk away from a brand they love after just one bad experience, for example:
  - Outdated settings can mean no internet access on subscriber devices.
  - Unavailable MMS – no picture, no group messaging or no video messaging.
  - Loss of tethering or hotspot feature.
  - Unavailable VoLTE services – no video calling or 5G.
- Demarcating device configuration exchange enable Ztar and OEMs to serve consumers and reduce frustration and care support costs. Without it, Ztar would have to provide every OEM with a form that is not standard.
- We got introduced to GSMA NSX by an OEM and swiftly were on-boarded.
- We worked with our MNOs to ensure accuracy of the network configuration settings, the file was uploaded to the platform. MNO engagement is critical for MVNO accurate upload. Monitor downloads.
Experience is the Strategy

OEM Benefit

✓ Update network settings as they become available while new and current devices can access and configure

✓ Reduces operational costs by getting access to hundreds of MVNEs in one platform

✓ Reduces operational costs by MNOs to support their reseller/MVNO network configuration (APN, MMS, ...) to support the considerable variety of devices

✓ Open direct to consumer business model for purchase the device activate on any brand/network

✓ Standardized template means settings can be shared quickly and easily, IMS and APN settings always configured correctly on devices in your network

✓ Network settings are published to current and future devices
Experience is the Strategy

Next

✓ Activating eSIM and managed subscriptions
✓ Device Validation
✓ Mediation and roaming services for MVNX
✓ MDN Management Services
Thank you for joining, any questions?