



# 2023 Orange Group DSBO campaign in Romania

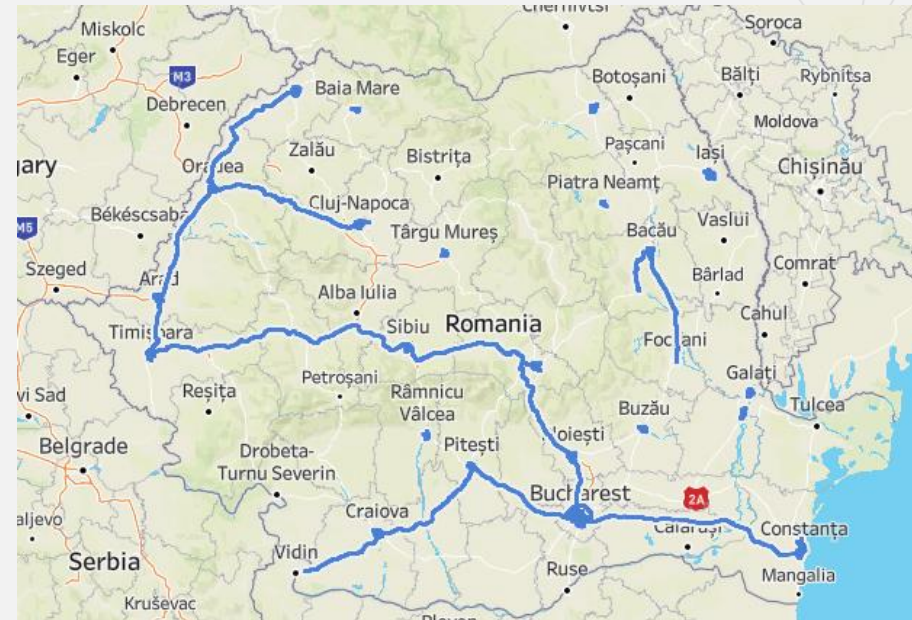
Campaign results

# Change History

| Version | Date        | Changes         |
|---------|-------------|-----------------|
| 1.0     | 09/Nov/2023 | Initial version |
|         |             |                 |
|         |             |                 |

# Campaign methodology

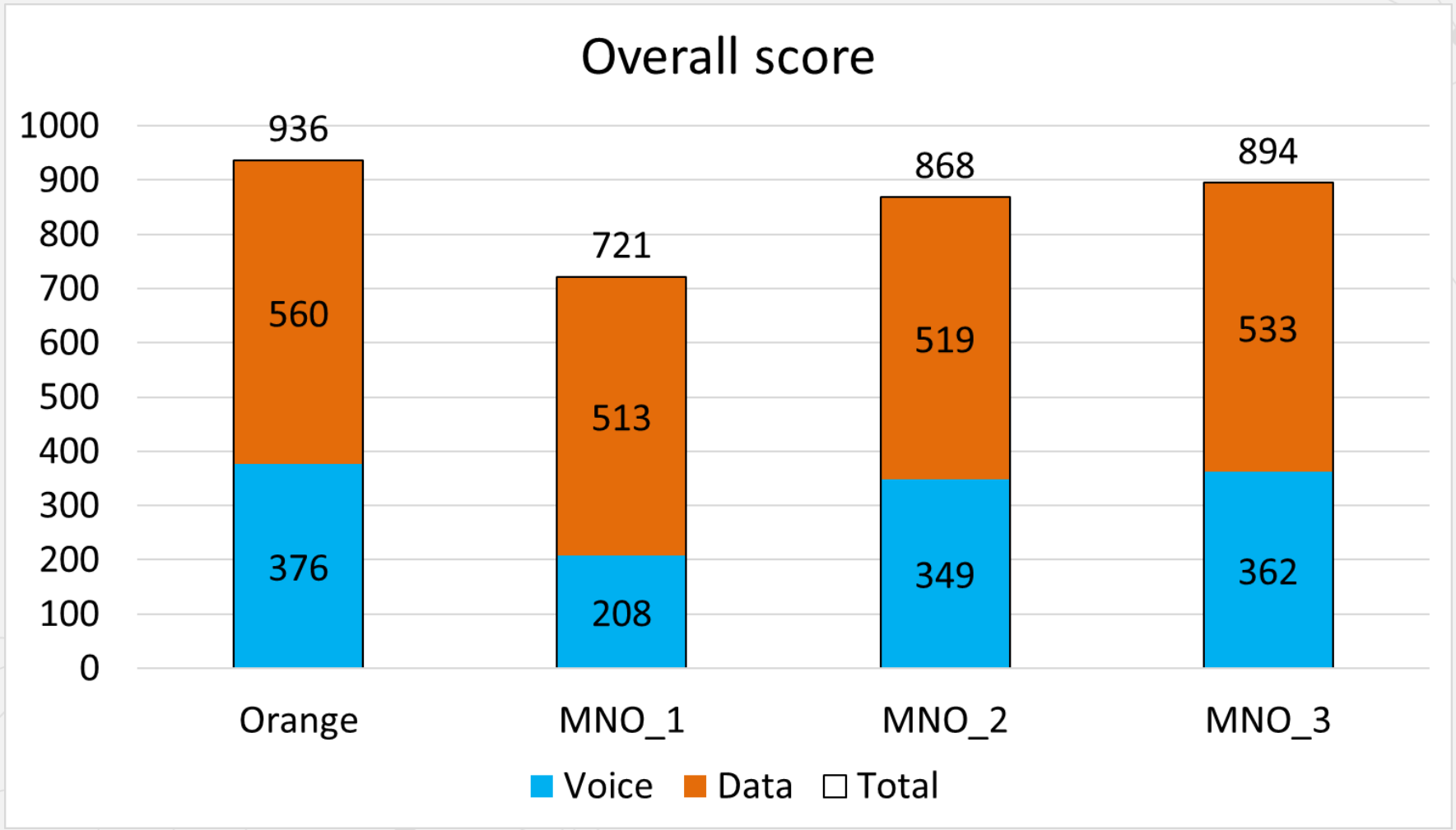
- » Measurements were conducted by driving 2 cars with Rohde & Schwarz equipment across Romania. Smartphones were installed in-car, such that the measurements represent in-car performance
- » The campaign was conducted between 21/August/2023 and 15/September/2023, including more than 110 hours of drive tests per car.
- » Big cities, small cities & conn.roads were selected based on their importance and population
- » A total distance of roughly 4,000 km was covered during the tests; over 3,500 voice calls were made on each network; and over 28,000 data tests were conducted per network.



# Campaign setup

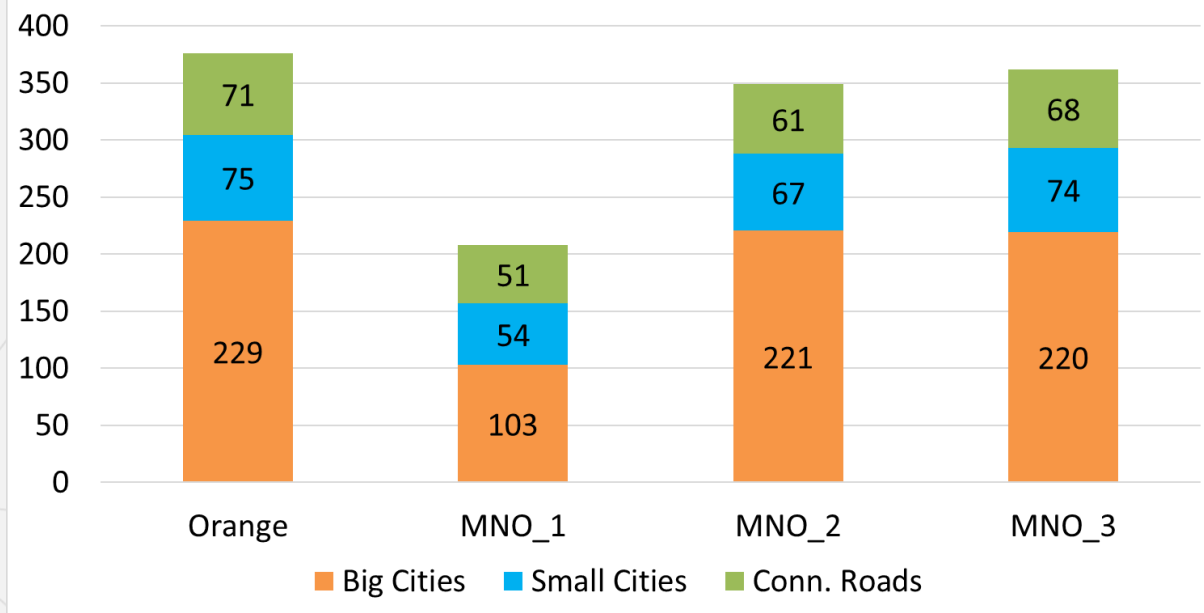
|            | VoLTE   | 5G   |
|------------|---|--|
| Device     | Samsung Galaxy S22+   | Samsung Galaxy S22+  |
| Test cases | Mobile-to-mobile calls<br>Best available voice technology<br>115 sec call window<br>85 sec call duration<br>15 sec call setup time out<br>HTTP 100kB traffic injection per call | Data 5G preferred<br>HTTP DL & UL multi-stream tests 7s<br>HTTPS 10MB DL & 5MB UL file transfers<br>8 live web pages<br>YouTube FHD live stream ~ 30s<br>YouTube UHD buffered stream ~ 45s |
| Routes     | Drive tests in Big cities (57%), Small cities (17%), Conn.Roads (26%)   |  |
| Scoring    | Orange Group methodology, based on ETSI TR 103 559  |  |

# Overall score per service

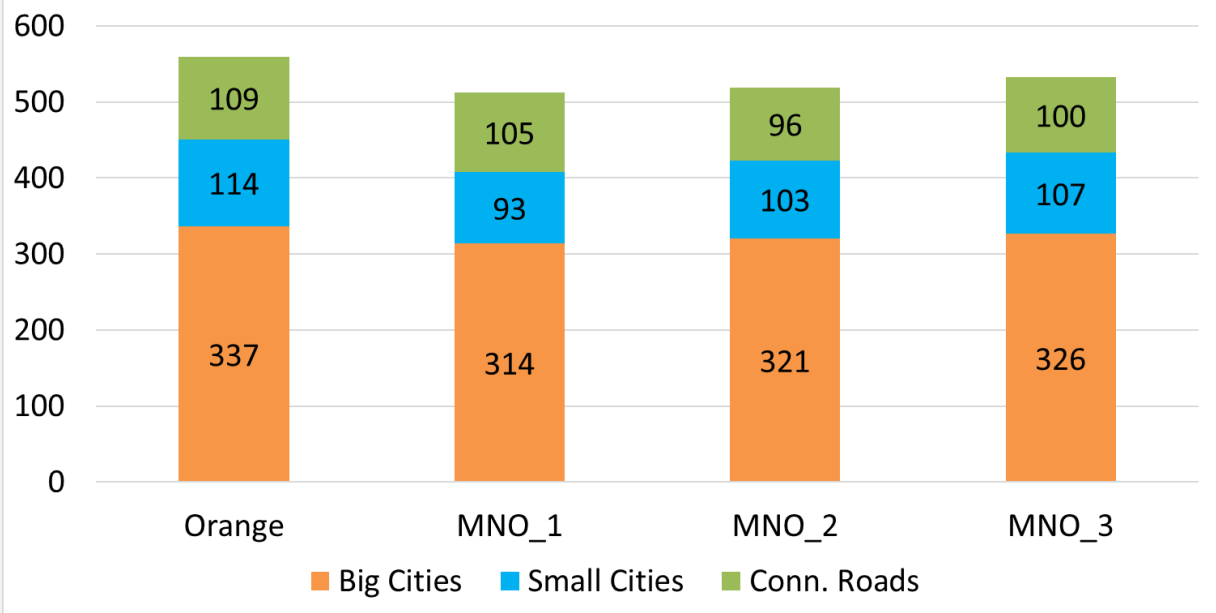


# Data & voice score breakdown per area

### Voice score breakdown per area



### Data score breakdown per area



# Voice & data service KPIs overview - Big cities

» Big cities aggregation voice & data service KPIs overview

| BIG CITIES SUMMARY      |                       |        | ORANGE | MNO_1  | MNO_2 | MNO_3  |
|-------------------------|-----------------------|--------|--------|--------|-------|--------|
| VOICE/VOLTE M2M         | QUALIFIED             | [%]    | 99.5%  | 91.4%  | 98.9% | 99.0%  |
|                         | CALL SETUP TIME       | [sec]  | 2.0    | 3.6    | 2.3   | 1.9    |
|                         | AVG SPEECH QUAL       | [#]    | 4.7    | 4.0    | 4.6   | 4.5    |
| HTTP DOWNLOAD FDTT (7s) | QUALIFIED             | [%]    | 99.7%  | 98.9%  | 99.4% | 99.6%  |
|                         | AVERAGE DATA RATE     | [Mbps] | 225.7  | 77.4   | 62.5  | 98.3   |
|                         | P10 DATA RATE         | [Mbps] | 41.0   | 22.1   | 25.2  | 19.4   |
|                         | P90 DATA RATE         | [Mbps] | 532.4  | 157.6  | 108.9 | 220.5  |
| HTTP UPLOAD FDTT(7s)    | QUALIFIED             | [%]    | 99.9%  | 99.5%  | 99.6% | 99.9%  |
|                         | AVERAGE DATA RATE     | [Mbps] | 48.1   | 24.0   | 36.1  | 40.2   |
|                         | P10 DATA RATE         | [Mbps] | 12.0   | 8.9    | 11.7  | 12.5   |
|                         | P90 DATA RATE         | [Mbps] | 89.4   | 40.1   | 62.2  | 68.1   |
| HTTP FILE DL (10MB)     | QUALIFIED             | [%]    | 99.9%  | 99.2%  | 99.6% | 99.8%  |
|                         | AVERAGE SESSION TIME  | [sec]  | 1.5    | 2.5    | 2.3   | 2.4    |
|                         | P10 DATA RATE         | [Mbps] | 30.2   | 18.1   | 22.0  | 18.0   |
|                         | P90 DATA RATE         | [Mbps] | 199.2  | 106.6  | 86.3  | 129.6  |
| HTTP FILE UL(5 MB)      | QUALIFIED             | [%]    | 99.8%  | 99.3%  | 99.8% | 99.6%  |
|                         | AVERAGE SESSION TIME  | [sec]  | 2.6    | 4.4    | 3.0   | 2.5    |
|                         | P10 DATA RATE         | [Mbps] | 8.8    | 5.5    | 7.9   | 9.6    |
|                         | P90 DATA RATE         | [Mbps] | 56.5   | 30.3   | 44.0  | 46.3   |
| HTTP LIVE PAGE DL       | QUALIFIED             | [%]    | 99.1%  | 99.0%  | 98.1% | 99.1%  |
|                         | TIME TO 1st 1000kByte | [sec]  | 1.9    | 1.8    | 1.9   | 1.8    |
| YouTube STREAMING HD    | QUALIFIED             | [%]    | 99.9%  | 100.0% | 99.7% | 100.0% |
|                         | START TIME            | [sec]  | 0.8    | 0.7    | 0.8   | 0.7    |
|                         | VMOS                  | [#]    | 4.3    | 4.3    | 4.3   | 4.3    |
| YouTube STREAMING 4k    | QUALIFIED             | [%]    | 100.0% | 99.7%  | 99.7% | 99.9%  |
|                         | START TIME            | [sec]  | 0.4    | 0.3    | 0.3   | 0.3    |
|                         | VMOS                  | [#]    | 4.6    | 4.6    | 4.6   | 4.6    |

# Voice & data service KPIs overview - Small cities

» Small cities aggregation voice & data service KPIs overview

| BIG CITIES SUMMARY      |                       |        | ORANGE | MNO_1 | MNO_2  | MNO_3  |
|-------------------------|-----------------------|--------|--------|-------|--------|--------|
| VOICE/VOLTE M2M         | QUALIFIED             | [%]    | 99.2%  | 95.8% | 97.6%  | 99.0%  |
|                         | CALL SETUP TIME       | [sec]  | 2.0    | 3.4   | 2.5    | 2.0    |
|                         | AVG SPEECH QUAL       | [#]    | 4.6    | 4.0   | 4.6    | 4.5    |
| HTTP DOWNLOAD FDTT (7s) | QUALIFIED             | [%]    | 100.0% | 96.5% | 99.4%  | 99.6%  |
|                         | AVERAGE DATA RATE     | [Mbps] | 278.4  | 50.7  | 58.8   | 52.6   |
|                         | P10 DATA RATE         | [Mbps] | 39.0   | 13.4  | 19.1   | 14.6   |
|                         | P90 DATA RATE         | [Mbps] | 575.2  | 95.2  | 108.3  | 101.6  |
| HTTP UPLOAD FDTT(7s)    | QUALIFIED             | [%]    | 99.8%  | 99.1% | 99.8%  | 99.8%  |
|                         | AVERAGE DATA RATE     | [Mbps] | 54.2   | 18.5  | 33.2   | 36.1   |
|                         | P10 DATA RATE         | [Mbps] | 14.9   | 7.7   | 10.1   | 11.7   |
|                         | P90 DATA RATE         | [Mbps] | 102.9  | 33.0  | 57.2   | 63.9   |
| HTTP FILE DL (10MB)     | QUALIFIED             | [%]    | 100.0% | 96.9% | 99.8%  | 98.9%  |
|                         | AVERAGE SESSION TIME  | [sec]  | 1.4    | 3.5   | 2.9    | 3.3    |
|                         | P10 DATA RATE         | [Mbps] | 30.3   | 13.3  | 15.0   | 14.2   |
|                         | P90 DATA RATE         | [Mbps] | 223.9  | 81.5  | 85.5   | 81.8   |
| HTTP FILE UL(5 MB)      | QUALIFIED             | [%]    | 100.0% | 98.9% | 99.3%  | 100.0% |
|                         | AVERAGE SESSION TIME  | [sec]  | 2.5    | 5.4   | 2.9    | 2.8    |
|                         | P10 DATA RATE         | [Mbps] | 10.1   | 4.3   | 7.9    | 8.0    |
|                         | P90 DATA RATE         | [Mbps] | 60.0   | 27.4  | 39.8   | 42.8   |
| HTTP LIVE PAGE DL       | QUALIFIED             | [%]    | 99.5%  | 95.5% | 95.1%  | 99.5%  |
|                         | TIME TO 1st 1000kByte | [sec]  | 1.9    | 1.8   | 2.1    | 1.9    |
| YouTube STREAMING HD    | QUALIFIED             | [%]    | 100.0% | 98.7% | 100.0% | 100.0% |
|                         | START TIME            | [sec]  | 0.8    | 0.8   | 0.9    | 0.8    |
|                         | VMOS                  | [#]    | 4.3    | 4.2   | 4.3    | 4.3    |
| YouTube STREAMING 4k    | QUALIFIED             | [%]    | 100.0% | 98.6% | 99.6%  | 100.0% |
|                         | START TIME            | [sec]  | 0.5    | 0.5   | 0.4    | 0.3    |
|                         | VMOS                  | [#]    | 4.5    | 4.5   | 4.5    | 4.5    |



# Voice & data service KPIs overview - Conn. Roads

» Conn. Roads aggregation voice & data service KPIs overview

| BIG CITIES SUMMARY      |                       |        | ORANGE | MNO_1 | MNO_2 | MNO_3 |
|-------------------------|-----------------------|--------|--------|-------|-------|-------|
| VOICE/VOLTE M2M         | QUALIFIED             | [%]    | 97.7%  | 92.8% | 94.2% | 96.9% |
|                         | CALL SETUP TIME       | [sec]  | 2.2    | 3.4   | 2.3   | 2.2   |
|                         | AVG SPEECH QUAL       | [#]    | 4.6    | 3.9   | 4.5   | 4.4   |
| HTTP DOWNLOAD FDTT (7s) | QUALIFIED             | [%]    | 99.0%  | 99.1% | 94.8% | 96.0% |
|                         | AVERAGE DATA RATE     | [Mbps] | 107.1  | 49.7  | 52.1  | 53.0  |
|                         | P10 DATA RATE         | [Mbps] | 14.3   | 14.2  | 8.5   | 7.4   |
|                         | P90 DATA RATE         | [Mbps] | 276.9  | 94.3  | 108.8 | 128.0 |
| HTTP UPLOAD FDTT(7s)    | QUALIFIED             | [%]    | 99.3%  | 97.7% | 97.8% | 98.8% |
|                         | AVERAGE DATA RATE     | [Mbps] | 32.5   | 19.7  | 25.5  | 25.7  |
|                         | P10 DATA RATE         | [Mbps] | 5.8    | 4.5   | 3.1   | 5.8   |
|                         | P90 DATA RATE         | [Mbps] | 65.5   | 34.9  | 55.1  | 55.2  |
| HTTP FILE DL (10MB)     | QUALIFIED             | [%]    | 99.1%  | 98.7% | 95.2% | 95.7% |
|                         | AVERAGE SESSION TIME  | [sec]  | 3.1    | 3.6   | 4.7   | 4.8   |
|                         | P10 DATA RATE         | [Mbps] | 13.0   | 11.5  | 7.3   | 7.3   |
|                         | P90 DATA RATE         | [Mbps] | 143.9  | 77.6  | 87.1  | 86.7  |
| HTTP FILE UL(5 MB)      | QUALIFIED             | [%]    | 97.7%  | 97.8% | 98.7% | 98.7% |
|                         | AVERAGE SESSION TIME  | [sec]  | 4.9    | 5.9   | 6.8   | 5.2   |
|                         | P10 DATA RATE         | [Mbps] | 4.7    | 3.5   | 2.7   | 3.9   |
|                         | P90 DATA RATE         | [Mbps] | 46.8   | 27.2  | 39.7  | 40.8  |
| HTTP LIVE PAGE DL       | QUALIFIED             | [%]    | 98.2%  | 98.0% | 94.8% | 94.9% |
|                         | TIME TO 1st 1000kByte | [sec]  | 1.9    | 1.8   | 2.0   | 1.9   |
| YouTube STREAMING HD    | QUALIFIED             | [%]    | 99.7%  | 99.4% | 98.8% | 99.4% |
|                         | START TIME            | [sec]  | 0.8    | 0.7   | 1.0   | 1.0   |
|                         | VMOS                  | [#]    | 4.2    | 4.3   | 4.2   | 4.2   |
| YouTube STREAMING 4k    | QUALIFIED             | [%]    | 100.0% | 99.1% | 99.4% | 98.2% |
|                         | START TIME            | [sec]  | 0.4    | 0.4   | 0.4   | 0.4   |
|                         | VMOS                  | [#]    | 4.5    | 4.5   | 4.5   | 4.5   |



EXPERTS IN **RADIO ACCESS** AND **MOBILE DATA**

Commsquare NV  
Dellingstraat 34/1, 2800 Mechelen, Belgium  
T: +32 15 52 88 74

Commsquare Hellas  
Paparrigopoulou 21, 15343 Ag. Paraskevi, Athens, Greece  
T: +30 210 64 45 022

Commsquare Ltd  
Third floor Connexions Building  
159 Princes Street Ipswich Suffolk IP11QJ, UK  
T: +44 1473 487 130

Regional Office Jordan  
25 Otbah Ben Ghazwan Street, Suite 205, Amman, Jordan  
T: +962 6 200 5688

[www.commsquare.com](http://www.commsquare.com)