

CERTIFICATE

P3 communications GmbH

Am Kraftversorgungsturm 3, D-52070 Aachen, Germany

hereby certifies that



Bakcell

Bakcell Head Office

Port Baku South Tower

153 Neftchilar Ave, Baku AZ1010, Azerbaijan

achieved „**Best in Test**“ with a

Total Score of **537 of 1000**

in the **Mobile Benchmark Azerbaijan 08/2017.**

(Score 261 of 400 in Voice, Score 276 of 600 in Data Services)



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Head of Network Testing
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Measurement Setup

| | Voice | Data |
|---------------------------------|--|---|
| Device | Samsung Galaxy S7 Cat9 P3 attenuator | Samsung Galaxy S7 Cat9 P3 attenuator |
| Test Cases | Mobile-to-Mobile Mobile-to-Mobile (M2M) Side1 (4G preferred) to Side2 (4G preferred) Side1 (4G preferred) to Side2 (4G preferred) 115 sec call window 70 sec call duration 15 sec call setup timeout Data traffic injection on both sides (100KB) (1 download per call window) | 4G CA preferred HTTP DL datastream 7s HTTP UL datastream 7s HTTP 3MB DL fixed file transfer HTTP 1MB UL fixed file transfer Web Browsing - Kepler ETSI Ref. Page 10 Live web pages (50% http, 50% https) YouTube video streaming - 45s |
| Mobility and Route Types | 100% Drivetest 55% in Cities, 19% in Towns and 26% on Roads | |
| Samples | ~ 5.000 per Operator | ~ 1.200 per Operator per Service |
| Dates | 12 measurement days August 1st – August 17th, 2017 | |

Testing Route



Score Points and Breakdown

The following table indicates the score points achieved by the networks under test in the modules “Voice” and “Data Services” as well as the breakdown of achieved points in the geographical categories “Cities”, “Towns” and “Roads”.

| Module | Infrastructure | Max. | Bakcell | Operator 2 | Operator 3 |
|--------------|----------------|--------------|------------|------------|------------|
| Voice | Total | 400 | 261 | 146 | 262 |
| | Cities | 240 | 60% | 17% | 61% |
| | Towns | 80 | 78% | 70% | 73% |
| | Roads | 80 | 69% | 62% | 70% |
| Data | Total | 600 | 276 | 297 | 235 |
| | Cities | 360 | 59% | 56% | 50% |
| | Towns | 120 | 19% | 42% | 19% |
| | Roads | 120 | 33% | 38% | 26% |
| TOTAL | | 1.000 | 537 | 443 | 496 |

Shown voice, data and total scores are rounded

The following table indicates the achieved percentage of the maximum score in each of the different data services.

| Data | Service Group | Max. | Bakcell | Operator 2 | Operator 3 |
|---------------|---------------|------|---------|------------|------------|
| Cities | Web Browsing | 108 | 44% | 45% | 42% |
| | File Download | 90 | 70% | 66% | 43% |
| | File Upload | 90 | 65% | 45% | 65% |
| | YouTube | 72 | 62% | 73% | 52% |
| | | | | | |
| Towns | Web Browsing | 36 | 8% | 41% | 8% |
| | File Download | 30 | 27% | 64% | 16% |
| | File Upload | 30 | 19% | 14% | 30% |
| | YouTube | 24 | 27% | 52% | 27% |
| | | | | | |
| Roads | Web Browsing | 36 | 9% | 36% | 11% |
| | File Download | 30 | 50% | 54% | 28% |
| | File Upload | 30 | 46% | 30% | 40% |
| | YouTube | 24 | 30% | 32% | 27% |
| | | | | | |

Voice KPI Overview

The following table indicates the achieved values of all networks under test in each of the relevant Voice Key Performance Indicators (KPIs) for the geographical categories “Cities”, “Towns” and “Roads”.

| Voice M2M | KPI Name | Unit | Bakcell | Operator 2 | Operator 3 |
|---------------|--------------------|-----------|---------|------------|------------|
| Cities | Qualifier | [%] | 95,8 | 88,6 | 96,1 |
| | Call Setup Time | [s] | 6,8 | 7,1 | 6,8 |
| | AVG Speech Quality | [MOS-LQO] | 3,0 | 2,8 | 3,0 |
| | | | | | |
| Towns | Qualifier | [%] | 98,5 | 97,5 | 97,6 |
| | Call Setup Time | [s] | 6,2 | 5,5 | 6,3 |
| | AVG Speech Quality | [MOS-LQO] | 3,3 | 2,8 | 3,4 |
| | | | | | |
| Roads | Qualifier | [%] | 95,1 | 93,9 | 95,4 |
| | Call Setup Time | [s] | 6,1 | 5,6 | 6,2 |
| | AVG Speech Quality | [MOS-LQO] | 3,3 | 2,8 | 3,3 |
| | | | | | |

Data KPI Overview

The following table indicates the achieved values of all networks under test in each of the relevant Data Key Performance Indicators (KPIs) for the geographical categories “Cities”, “Towns” and “Roads”.

| Data Cities | KPI Name | Unit | Bakcell | Operator 2 | Operator 3 |
|---------------------|----------------------------|----------|---------|------------|------------|
| HTTP Live Page DL | Qualifier | [%] | 95,0 | 96,7 | 94,7 |
| | Time to first Byte | [ms] | 1671 | 1398 | 1603 |
| | Kbytes first second | [KB] | 188,0 | 172,6 | 224,2 |
| | | | | | |
| HTTP Static Page DL | Qualifier | [%] | 93,9 | 94,4 | 92,0 |
| | AVG Session Time | [s] | 2,9 | 4,5 | 2,7 |
| | | | | | |
| HTTP file DL 3MB | Qualifier | [%] | 99,0 | 98,4 | 89,4 |
| | AVG Session Time | [s] | 4,0 | 5,1 | 3,3 |
| | 90% faster than | [kbit/s] | 2278 | 2676 | 3656 |
| | 10% faster than | [kbit/s] | 33557 | 177645 | 18605 |
| | | | | | |
| HTTP file UL 1MB | Qualifier | [%] | 96,6 | 94,9 | 96,6 |
| | AVG Session Time | [s] | 2,6 | 4,5 | 2,3 |
| | 90% faster than | [kbit/s] | 1254 | 736 | 1379 |
| | 10% faster than | [kbit/s] | 14212 | 7928 | 18391 |
| | | | | | |
| HTTP DL FDTT 10s | Qualifier | [%] | 97,1 | 98,1 | 97,9 |
| | AVG throughput | [kbit/s] | 42493 | 17599 | 26615 |
| | 90% faster than | [kbit/s] | 3338 | 3379 | 3584 |
| | 10% faster than | [kbit/s] | 85682 | 35090 | 44635 |
| | | | | | |
| HTTP UL FDTT 10s | Qualifier | [%] | 96,4 | 92,5 | 95,5 |
| | AVG throughput | [kbit/s] | 24872 | 12376 | 25449 |
| | 90% faster than | [kbit/s] | 1426 | 723 | 1595 |
| | 10% faster than | [kbit/s] | 44174 | 27135 | 44510 |
| | | | | | |
| YouTube | Qualifier | [%] | 93,1 | 97,0 | 91,0 |
| | Start Time | [s] | 3,4 | 3,9 | 3,4 |
| | Playouts w/o interruptions | [%] | 98,3 | 97,0 | 98,2 |
| | AVG Resolution | [p] | 1046 | 1009 | 1045 |

| Data Towns | KPI Name | Unit | Bakcell | Operator 2 | Operator 3 |
|---------------------|----------------------------|----------|---------|------------|------------|
| HTTP Live Page DL | Qualifier | [%] | 78,3 | 96,1 | 79,7 |
| | Time to first Byte | [ms] | 4216 | 2413 | 3774 |
| | Kbytes first second | [KB] | 140,1 | 136,4 | 157,5 |
| | | | | | |
| HTTP Static Page DL | Qualifier | [%] | 73,9 | 93,6 | 73,0 |
| | AVG Session Time | [s] | 5,3 | 5,8 | 5,1 |
| | | | | | |
| HTTP file DL 3MB | Qualifier | [%] | 92,5 | 99,3 | 83,3 |
| | AVG Session Time | [s] | 9,7 | 8,1 | 8,6 |
| | 90% faster than | [kbit/s] | 1249 | 1929 | 1809 |
| | 10% faster than | [kbit/s] | 10703 | 9893 | 9372 |
| | | | | | |
| HTTP file UL 1MB | Qualifier | [%] | 87,8 | 90,5 | 92,7 |
| | AVG Session Time | [s] | 6,2 | 9,2 | 5,2 |
| | 90% faster than | [kbit/s] | 771 | 495 | 1000 |
| | 10% faster than | [kbit/s] | 7909 | 2251 | 5895 |
| | | | | | |
| HTTP DL FDTT 10s | Qualifier | [%] | 89,9 | 99,0 | 90,0 |
| | AVG throughput | [kbit/s] | 13314 | 6869 | 8515 |
| | 90% faster than | [kbit/s] | 1201 | 2358 | 1116 |
| | 10% faster than | [kbit/s] | 30821 | 11011 | 18447 |
| | | | | | |
| HTTP UL FDTT 10s | Qualifier | [%] | 90,5 | 85,5 | 84,7 |
| | AVG throughput | [kbit/s] | 5327 | 1952 | 5783 |
| | 90% faster than | [kbit/s] | 949 | 504 | 993 |
| | 10% faster than | [kbit/s] | 10519 | 2585 | 23607 |
| | | | | | |
| YouTube | Qualifier | [%] | 75,5 | 94,0 | 71,6 |
| | Start Time | [s] | 6,5 | 5,4 | 5,9 |
| | Playouts w/o interruptions | [%] | 93,9 | 94,4 | 91,3 |
| | AVG Resolution | [p] | 938 | 968 | 959 |

| Data Roads | KPI Name | Unit | Bakcell | Operator 2 | Operator 3 |
|---------------------|----------------------------|----------|---------|------------|------------|
| HTTP Live Page DL | Qualifier | [%] | 80,1 | 92,5 | 83,0 |
| | Time to first Byte | [ms] | 3833 | 2389 | 3639 |
| | Kbytes first second | [KB] | 140,5 | 131,5 | 156,7 |
| | | | | | |
| HTTP Static Page DL | Qualifier | [%] | 78,5 | 88,4 | 79,0 |
| | AVG Session Time | [s] | 5,4 | 6,0 | 5,2 |
| | | | | | |
| HTTP file DL 3MB | Qualifier | [%] | 96,2 | 95,6 | 82,2 |
| | AVG Session Time | [s] | 10,3 | 9,4 | 8,2 |
| | 90% faster than | [kbit/s] | 1244 | 1572 | 1773 |
| | 10% faster than | [kbit/s] | 20301 | 8255 | 12482 |
| | | | | | |
| HTTP file UL 1MB | Qualifier | [%] | 92,1 | 89,3 | 87,7 |
| | AVG Session Time | [s] | 5,2 | 9,5 | 5,2 |
| | 90% faster than | [kbit/s] | 1088 | 508 | 937 |
| | 10% faster than | [kbit/s] | 5543 | 2165 | 9324 |
| | | | | | |
| HTTP DL FDTT 10s | Qualifier | [%] | 88,7 | 93,4 | 89,7 |
| | AVG throughput | [kbit/s] | 13642 | 6397 | 9136 |
| | 90% faster than | [kbit/s] | 1582 | 1633 | 1739 |
| | 10% faster than | [kbit/s] | 41208 | 11821 | 25293 |
| | | | | | |
| HTTP UL FDTT 10s | Qualifier | [%] | 86,9 | 86,2 | 87,2 |
| | AVG throughput | [kbit/s] | 5559 | 2147 | 5382 |
| | 90% faster than | [kbit/s] | 1064 | 503 | 1116 |
| | 10% faster than | [kbit/s] | 11197 | 2707 | 13729 |
| | | | | | |
| YouTube | Qualifier | [%] | 72,7 | 83,5 | 72,5 |
| | Start Time | [s] | 6,0 | 5,8 | 6,0 |
| | Playouts w/o interruptions | [%] | 91,7 | 91,0 | 89,2 |
| | AVG Resolution | [p] | 965 | 921 | 943 |