



## **Public Benchmark 2015 - DACH**

### **Information Package for Network Operators**

P3 communications

Aachen, 01.12.2015

## **P3 will aim at using the latest hard and software. The device software and tariffs must be commercially available at a certain date to be used in a public benchmark**

### **HARDWARE**

- Drivetest devices are used in-car in dedicated P3 attenuation books which simulate light indoor scenario with approx. 7dB attenuation (compared to the same device placed outdoor)
- New attenuation is comparable to legacy ETSI TR based external antenna solution used in 2014, with 1-12 dB attenuation (compared to the same device place outdoor)
- Walktest devices don't use any attenuation
- The walktest counterpart car is also not using any attenuation solution but phone located in-car
  
- The 2015 voice smartphone is the Samsung S5 cat. 4 SM-G900F
- The 2015 data smartphone is the Samsung Galaxy Note 4 SM-N910F

### **SOFTWARE / FIRMWARE**

- P3 aims at using the latest compatible Android versions. Current version is Android 5.x 'Lollipop'
- **Default case is:** P3 will use the commercial available firmware based on OTA update or the operator's official web site
- **Exceptional case is:** No firmware is available, P3 will use a recent, neutral Samsung firmware, supporting state of the art technology and features
- Firmware commercially available on 1st of July will be the main candidates for public benchmark.
  
- VoLTE is assessed if commercial available in terms of device, firmware and tariff on 1st of July 2015 for DACH countries

**In 2015 we observe a strong focus on new packet switched voice service VoLTE which will be assessed with two additional and dedicated voice measurement clients**

## VOICE SERVICE DOMAIN

- Mobile-to-mobile voice assessment
- Call setup timeout set to 15 seconds, call duration 70 seconds and call window 115 seconds
- POLQA AMR-wideband evaluation using a 23.85 kbit/s, 6 sec reference sample in German language
- 8 speech samples are recorded per call, 4 samples are recorded per A and B-party device
- Call unsustainability failures are triggered if three or more speech samples in a call show POLQA < 1.6 or two consecutive samples show < 1.6
- Multi RAB is injected for each voice system and call on a random basis within the 115 second window
- Each network is measured with two voice clients per car/walktest system calling two clients in the second car/counterpart and vice versa (see figure 1 & 2)
- One legacy client is forced to 3G pref. mode, all others to 4G pref. Regarding the walktest system the forced 3G pref. mode client is on counterpart side
- Walktest and drivetest apply the same methodology

## VOICE SETUP SCHEMES FIGURE 1 & 2

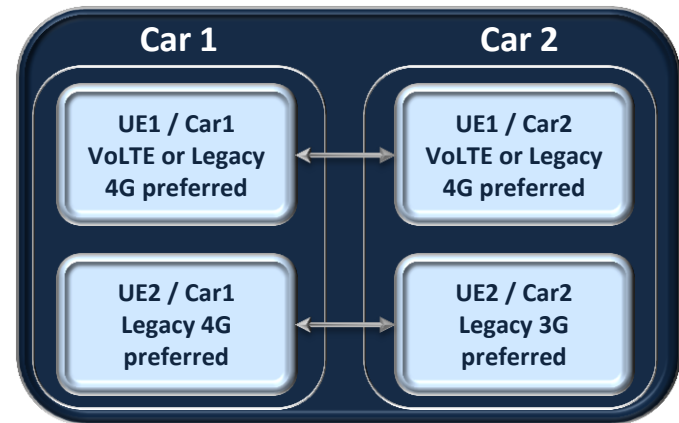


Figure 1: Voice Drivetest Methodology 2015

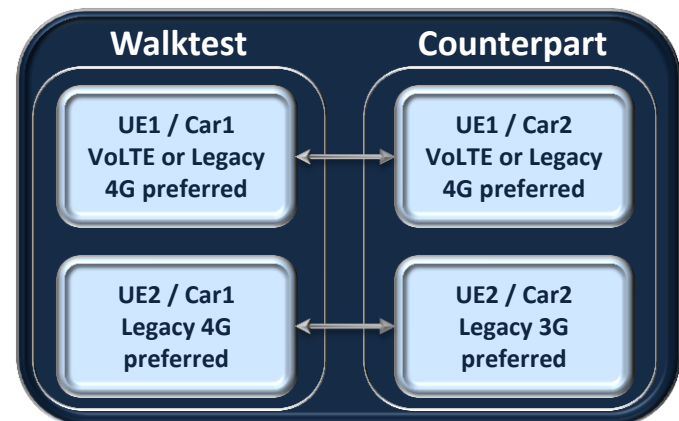


Figure 2: Voice Walktest Methodology 2015

## Regarding data service assessment the 2015 methodology was extended by carrier aggregation if offered by the network and more demanding performance thresholds

### DATA SERVICE DOMAIN

- Each car and the walktest system comes with a dedicated data device set to 4G pref. mode
- User Perception Test Case:
  - HTTP static browsing Kepler reference page
  - HTTP Live browsing
  - YouTube SD (360p) & HD (720p)
  - HTTP DL & UL fixed file transfer
  - HTTP Data Stream DL & UL
- HTTP Data Stream file transfer is evaluated based on one TCP socket approach which reflects user experience for major file transfer services
- Carrier aggregation will be evaluated if available in the target network and if bearer combination is supported by the official data device

### DATA SERVICE DOMAIN

#### Thresholds:

- Threshold timeouts including whole session for web browsing are set to 10 seconds and will lead to a cut-off failure if exceeded
- Cut-off transfer timeout for fixed file transfer in UL and DL direction are based on minimum throughput requirement of 384 kbit/s
- Data Stream cases showing a throughput less than 128 for DL or 64 for UL kbit/s will lead to a failure

## **P3 will perform drive test assessment of big and small cities together with highways, and walk test assessment for big cities and relevant railways**

### **DRIVETEST BIG CITY**

- 100% drivetest in this category
- Always the top 5 cities of a country under test are selected
- Additional selection of cities out of the top 50 (Top 25 in AT and CH)
- City selection will aim at geographical diversity

### **DRIVETEST SMALL CITY**

- Small city class is covered by a selection of cities along the major connecting roads
- 10% to 20% of the samples should be collected in small city class
- Maximum distance from the roads is 30 km
- 10k < City size < 100k

### **DRIVETEST CONNECTING ROADS**

- Major connecting roads between the big cities
- Highways and important national roads are the focus points
- Roads may partially be assessed in both directions
- 20% to 30% of the samples should be collected in this class

### **WALKTEST BIG CITY AOI**

- Top 4 cities for DE are always under test, and top 2 for AT&CH
- Additional selection of cities out of the top 10 for DE, and top 7 for AT&CH
- 6 to 20 Areas of Interest per city depending on the city size

### **WALKTEST BIG CITY PUBLIC TRANS.**

- Walktest teams will only use walking and public transport to travel between AOI and cities
- Intra-city travelling consists mainly of walking, sub-ways, busses or trams

### **WALKTEST TRAINS**

- Interconnecting train routes between walktest cities will be assessed
- Focus on long range trains
- 1<sup>st</sup> class and repeater wagons will be used if available

## Germany

The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered

### LOCATIONS Q1

#### Drivetest-Big cities:

- Berlin
- Hamburg
- München
- Köln
- Frankfurt
- Stuttgart
- Dortmund
- Bremen
- Dresden
- Mannheim
- Karlsruhe
- Braunschweig
- Aachen
- Hamm
- Potsdam

#### Walktest-Cities:

- Berlin
- Hamburg
- München
- Köln
- Frankfurt
- Dortmund

### LOCATIONS Q2

#### Drivetest-Big cities:

- Berlin
- Hamburg
- München
- Köln
- Frankfurt
- Düsseldorf
- Essen
- Hannover
- Nürnberg
- Bochum
- Bielefeld
- Aachen
- Leverkusen

#### Walktest-Cities:

- Berlin
- Hamburg
- München
- Köln
- Düsseldorf
- Stuttgart

### LOCATIONS Q3

#### Drivetest-Big cities:

- Berlin
- Hamburg
- München
- Köln
- Frankfurt
- Leipzig
- Duisburg
- Wuppertal
- Bonn
- Münster
- Augsburg
- Mönchengladbach
- Chemnitz
- Kassel

#### Walktest-Cities:

- Berlin
- Hamburg
- München
- Köln
- Essen
- Bremen

## Germany

The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered

### LOCATIONS Q1

#### Small cities:

- Delmenhorst
- Seevetal
- Neuruppin
- Ludwigsfelde
- Schwerte
- Oranienburg
- Neuwied
- Idstein
- Speyer
- Nuertingen
- Freising
- Schwabach
- Hof
- Northeim
- Hennef (Sieg)
- Limburg an der Lahn
- Bensheim
- Sindelfingen
- Neu-Ulm
- Dachau
- Pfaffenhofen a.d. Ilm
- Lauf a.d. Pegnitz
- Bayreuth
- Gunzburg
- Kamen
- Lauchhammer
- Nauen
- Norderstedt
- Parchim
- Peine
- Plauen
- Rotenburg
- Senftenberg
- Soest
- Unna
- Walsrode
- Wedemark
- Wittstock
- Wolfenbittel
- Zwickau

### LOCATIONS Q2

#### Small cities:

- Fuersteneufeldbruck
- Gera
- Weissenfels
- Falkensee
- Salzgitter
- Reinbek
- Cloppenburg
- Bramsche
- Georgsmarienhütte
- Buende
- Herford
- Luenen
- Willich
- Langenfeld (Rheinland)
- Stolberg
- Juelich
- Wesseling
- Ruesselsheim
- Bad Homburg v. d. Hoehe
- Kulmbach
- Naumburg (Saale)
- Merseburg
- Brandenburg a.d.H
- Hildesheim
- Buxtehude
- Vechta
- Ibbenbueren
- Melle
- Bad Oeynhausen
- Werl
- Castrop-Rauxel
- Grevenbroich
- Mettmann
- Dueren
- Kerpen
- Troisdorf

### LOCATIONS Q3

#### Small cities:

- Greven
- Vechta
- Neumuenster
- Henstedt-Ulzburg
- Bad Oldesloe
- Ahrensburg
- Grimma
- Limbach-Oberfrohna
- Gera
- Weimar
- Arnstadt
- Bad Hersfeld
- Baunatal
- Unna
- Schwerte
- Gevelsberg
- Velbert
- Mettmann
- Willich
- Erkelenz
- Troisdorf
- Hennef (Sieg)
- Weinheim
- Leimen
- Bruchsal
- Leonberg
- Goepingen
- Kirchheim unter Teck
- Fuersteneufeldbruck
- Dachau

## Germany

**Devices and latest commercial Firmwares assigned for Q3 Pre-Benchmark which will be main candidates for Q4 measurements**

### FIRMWARE LIST

Operator	Usecase	Device	Firmware			OS Versions
			(PDA)	(Modem)	(CSC)	
Telekom	CS VOICE	SM-G900F	G900FXXU1POGC	G900FXXU1POG1	G900FDTM1POG2	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FDTM1BOB6	Android 5.0.1
Vodafone	CS VOICE + VoLTE	SM-G900F	G900FXXU1POG7	G900FXXU1POG7	G900FVJV1POF2	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC5	N910FXXU1BOD2	N910FVFG1BOC2	Android 5.0.1
E-Plus	CS VOICE	SM-G900F	G900FXXU1BOD3	G900FXXU1BOD3	G900FDBT1BOD1	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FOXA1BOC3	Android 5.0.1
O2	CS VOICE + VoLTE	SM-G900F	G900FXXU1POFE	G900FXXU1POFE	G900FVIA1POFE	Android 5.0
	DATA	SM-N910F	N910FXXU1BOE5	N910FXXU1BOC3	N910FVIA1BOC1	Android 5.0.1



## Germany

### Tariffs and Carriers assignation

#### TARIFFS AND FREQUENCIES

Operator	Usecase	Tariff Name	APN
Telekom	CS VOICE	Complete Premium	internet.telekom
	DATA	Complete Premium	internet.telekom
Vodafone	CS VOICE	Red Premium	web.vodafone.de
	VoLTE	RED 20GB	web.vodafone.de
	DATA	RED 20GB	web.vodafone.de
E-Plus	CS VOICE	BASE All-In Plus + Internet Flat XXL Plus	internet.eplus.de
	DATA	BASE All-In Plus + Internet Flat XXL Plus	internet.eplus.de
O2	CS VOICE	O2 Blue All-In XL	internet
	VoLTE	o2 Blue All-In Premium	internet
	DATA	o2 Blue All-In Premium	internet

Operator	Carrier Type	Carrier 1	Carrier 2	Carrier 3	Carrier 4
Telekom Deutschland	3G UARFCN	10836	10812	-	-
Telekom Deutschland	4G EARFCN	6400	3050	1275	1300
Vodafone	3G UARFCN	10564	10588	10612	
Vodafone	4G EARFCN	6300	2850	-	
E-Plus	3G UARFCN	10663	10639	10687	10712
E-Plus	4G EARFCN	1855	1830	1805	3200
O2	3G UARFCN	10786	10762	10738	-
O2	4G EARFCN	6200	3350	1575	-

## Switzerland

The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered

### LOCATIONS Q1

#### Drivetest-Big cities:

- Zürich
- Genève
- Basel
- Lausanne
- Bern
- Winterthur
- Lugano
- Biel
- Fribourg
- Schaffhausen
- Sion
- Emmen

#### Walktest-Cities:

- Zürich
- Genève
- Bern
- Winterthur

### LOCATIONS Q2

#### Drivetest-Big cities:

- Zürich
- Genève
- Basel
- Lausanne
- Bern
- Luzern
- St. Gallen
- Thun
- Chur
- Neuchâtel
- Zug
- Kriens

#### Walktest-Cities:

- Zürich
- Genève
- Basel
- Bern

### LOCATIONS Q3

#### Drivetest-Big cities:

- Zürich
- Genève
- Basel
- Lausanne
- Bern
- Winterthur
- Köniz
- La Chaux-de-Fonds
- Vernier
- Uster
- Lancy
- Yverdon-les-Bains

#### Walktest-Cities:

- Zürich
- Genève
- Basel
- Lausanne
- Luzern

## Switzerland

The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered

### LOCATIONS Q1

#### Small cities:

- Duebendorf
- Montreux
- Dietikon
- Baar
- Meyrin
- Kloten
- Bellinzona
- Renens
- Regensdorf
- Muttenz
- Baden
- Worb
- Nyon
- Effretikon
- Pully
- Vevey
- Adliswil
- Ostermündingen
- Monthey
- Pratteln
- Steffisburg
- Martigny
- Morges
- Spiez

### LOCATIONS Q2

#### Small cities:

- Uzwil
- Herisau
- Romanshorn
- Altstätten
- Glarus Nord
- Mendrisio
- Horw
- Solothurn
- Val-de-Travers
- Onex
- Will
- Gossau
- Arbon
- Amriswil
- Buchs
- Locarno
- Schwyz
- Cham
- Grenchen
- Bulle

### LOCATIONS Q3

#### Small cities:

- Rapperswil Jona
- Frauenfeld
- Riehen
- Waedenswil
- Wetzikon
- Allschwil
- Carouge
- Wettingen
- Horgen
- Kreuzlingen
- Val-de-Ruz
- Olten
- Aarau
- Langenthal
- Sierre
- Bulach
- Binningen
- Lyss
- Freienbach
- Wohlen
- Schlieren
- Brig-Gils
- Opfikon
- Stafa
- Wallisellen
- Weinfelden
- Le Locle

## Switzerland

### Devices and Firmwares assigned for Q3 Pre-Benchmark and main candidates for Q4

#### FIRMWARE LIST

Operator	Usecase	Device	Firmware			OS Versions
			(PDA)	(Modem)	(CSC)	
Swisscom	CS VOICE + VoLTE	SM-G900F	G900FXXU1POFA	G900FXXU1POFA	G900FSWC1POFA	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FVFG1BOC2	Android 5.0.1
Sunrise	CS VOICE	SM-G900F	G900FXXU1POF4	G900FXXU1PODT	G900FAUT1POF1	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC5	N910FXXU1BOC4	N910FAUT1BOD1	Android 5.0.1
Salt	CS VOICE	SM-G900F	G900FXXU1POF4	G900FXXU1PODT	G900FAUT1POF1	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC5	N910FXXU1BOC4	N910FAUT1BOD1	Android 5.0.1

## Switzerland

### Tariffs and Carriers assignation

#### TARIFFS AND FREQUENCIES

Operator	Usecase	Tariff Name	APN
Swisscom	CS VOICE	NATEL Infinity XL plus	gprs.swisscom.ch
	VoLTE	NATEL Infinity XL	gprs.swisscom.ch
	DATA	NATEL Infinity XL plus	gprs.swisscom.ch
Sunrise	CS VOICE	Sunrise freedom MAX, Sunrise Now Max	internet
	DATA	Sunrise freedom MAX, Sunrise Now Max	internet
Salt	CS VOICE	Orange ME + unlimited Swiss + unlimited Surf	internet
	DATA	Orange ME + unlimited Swiss + unlimited Surf	internet

Operator	Carrier Type	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5	Carrier 6	Carrier 7	Carrier 8
SALT	3G UARFCN	10713	10738	10762	2938	--	--	--	--
SALT	4G EARFCN	1676	3300	6400	1651	--	--	--	--
Sunrise	3G UARFCN	10639	10664	10688	2963	2988	3005	--	--
Sunrise	4G EARFCN	1826	1850	6200	2850	--	--	--	--
Swisscom	3G UARFCN	10565	10589	10614	10787	10812	10836	3050	3071
Swisscom	4G EARFCN	6300	3100	1301	1401	--	--	--	--

## Austria

The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered

### LOCATIONS Q1

#### Drivetest-Big cities:

- Wien
- Graz
- Linz
- Salzburg
- Innsbruck
- Klagenfurt
- Villach
- Wels
- Dornbirn
- Wiener Neustadt
- Feldkirch
- Klosterneuburg
- Amstetten

#### Walktest-Cities:

- Wien
- Graz
- Innsbruck
- Klagenfurt

### LOCATIONS Q2

#### Drivetest-Big cities:

- Wien
- Graz
- Linz
- Salzburg
- Innsbruck
- Klagenfurt
- Wels
- Sankt Poelten
- Steyr
- Feldkirch
- Bregenz
- Wolfsberg
- Leoben
- Moedling

#### Walktest-Cities:

- Wien
- Graz
- Linz
- Salzburg
- Klagenfurt

### LOCATIONS Q3

#### Drivetest-Big cities:

- Wien
- Graz
- Linz
- Salzburg
- Innsbruck
- Klagenfurt
- Villach
- Wels
- Wiener Neustadt
- Leonding
- Baden
- Krams an der Donau
- Traun
- Amstetten
- Lustenau
- Kapfenberg

#### Walktest-Cities:

- Wien
- Graz
- Linz
- Salzburg
- Villach

## Austria

**The public benchmark city grid will be always a sub-scope of the pre-benchmarks offered in the yearly cycle. In 2015, 3 relevant benchmarks will be offered**

### LOCATIONS Q1

#### Small cities:

- Hallein
- Kufstein
- Traiskirchen
- Schwechat
- Stockerau
- Saalfelden
- Ansfelden
- Tulln an der Donau
- Hohenems
- Spittal an der Drau
- Telfs
- Ternitz
- Perchtoldsdorf
- Bludenz
- Schwaz
- Hall in Tirol
- Gmunden
- Sankt Veit an der Glan
- Hard
- Voecklabruck
- Goetzis
- Seekirchen am Wallersee

### LOCATIONS Q2

#### Small cities:

- Lauterach
- Imst
- Zell am See
- Bischofshofen
- Feldkirchen in Karnten
- Sankt Andra
- Trofaiach
- Wals-Siezenheim
- Marchtrenk
- Waidhofen
- Brunn am Gebirge
- Rankweil
- Worgl
- Sankt Johann im Pongau
- Spittal an der Drau
- Volkermarkt
- Bruck an der Mur
- Hallein
- Laakirchen
- Enns
- Perchtoldsdorf

### LOCATIONS Q3

#### Small cities:

- Bludenz
- Hall in Tirol
- Saalfelden
- Ried im Innkreis
- Stockerau
- Ganserndorf
- Gross-Enzerdorf
- Traiskirchen
- Eisenstadt
- Bad Voslau
- Neunkirchen
- Lauterach
- Knittelfeld
- Hohenems
- Telfs
- Schwaz
- Korneuburg
- Gerasdorf bei Wien
- Ebreichsdorf
- Ternitz
- Sankt Veit a.d. Glan

## Austria

**Devices and latest commercial Firmwares assigned for Q3 Pre-Benchmark which will be main candidates for Q4 measurements**

### FIRMWARE LIST

Operator	Usecase	Device	Firmware			OS Versions
			(PDA)	(Modem)	(CSC)	
A1	CS VOICE & VoLTE	SM-G900F	G900FXXU1POF9	G900FXXU1POF9	G900FMOV1POF2	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FVFG1BOC2	Android 5.0.1
TMA	CS VOICE	SM-G900F	G900FXXU1POEA	G900FXXU1POEA	G900FTTR1POEA	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FTTR1BOB6	Android 5.0.1
H3G	CS VOICE	SM-G900F	G900FXXU1BOD3	G900FXXU1BOD3	G900FDRE1BOD1	Android 5.0
	DATA	SM-N910F	N910FXXU1BOC3	N910FXXU1BOC3	N910FDRE1BOC1	Android 5.0.1



## Austria

### Tariffs and Carriers assignation

#### TARIFFS AND FREQUENCIES

Operator	Usecase	Tariff Name	APN
A1	CS VOICE	A1 Smart 4G/LTE	a1.net
	VoLTE	A1 Smart 4G/LTE	a1.net
	DATA	A1 Smart 4G/LTE	a1.net
TMA	CS VOICE	My Mobile Extreme	internet.t-mobile.at
	DATA	My Mobile Extreme	internet.t-mobile.at
H3G	CS VOICE	Hallo Premium	drei.at
	DATA	Hallo Premium	drei.at

Operator	Carrier Type	Carrier 1	Carrier 2	Carrier 3	Carrier 4	Carrier 5
A1	3G UARFCN	10564	10588	10613	10637	-
A1	4G EARFCN	2850	3175	6250	6200	-
TMA	3G UARFCN	10786	10811	10836	-	-
TMA	4G EARFCN	1601	3050	6400	-	-
H3G	3G UARFCN	10662	10687	10711	10736	10761
H3G	4G EARFCN	1814	3350	1864	-	-