

Mobile trends

Latest trends and innovations in delivering high quality mobile voice and broadband services

Skopje, September 2016



HD Voice

- HD Voice is actually known as WideBand Adaptive Multi Rate(WB-AMR), provides exceptional quality of voice calls over mobile network
- Defined in 3GPP 26.201, 9 codec rates ,highest speed of 23.85kbps.
- The standard supports voice bandwidth of 50Hz-7kHz and sampling rate of 16KHz, much more than standard 3G codec (200-3400Hz)
- The lowest rate of achieving HD voice quality is 12.65kbps
- Pre-requisites on NW side for HD Voice (TFO and TrFO) evading double voice code conversion hence improving the speech quality



HD Voice

- Voice quality measurement is represented through Mean Opinion Score (MOS) values
- Standards:
 - PESQ (Perceptual Evaluation of Speech Quality) ITU-T Rec. P.862.1 (1997)
 - POLQA (Perceptual Objective Listening Quality Assessment) ITU-T Rec. P.863 9 (2011)
- Speech quality improvements in the NW (POLQA)

		DUAL MODE			
			Avg.	Min.	Max.
MO S6+	Round1	VIP AMR NB	3.092	1.845	4.038
	Round2	VIP AMR WB	3.218	1.985	4.028
	Round3	VIP AMR WB+EVA	3.322	1.323	4.088
	Round4	VIP AMR WB+EVA+pwr.cntnl.	3.609	1.342	4.038



HD Voice

- Speech quality independently verified by 3rd party in December 2016



1st in Voice

opportunity for improvement on call setup time and call accessibility



3.8 MOS Speech Quality

supported by high 95% overall AMR WB codec usage

- Next steps:
- Further improvement in Radio interface
- Virtualized Circuit and Packet Core
- VoLTE
 - Improved speech quality
 - Faster call setup
 - Fast call re-establishment

Qualified Speech Quality

One.Vip



4G+ developments

- 4G+ is set of features/activities paving the road towards 5G
 - 4x4 MIMO
 - CA (carrier aggregation) in DL&UL
 - Higher order modulation in DL&UL
 - CoMP (Coordinated MultiPoint)
 - Smart Relay
 - Currently in one.Vip Network, CA and part of CoMP are deployed
 - 4x4MIMO, Higher order Modulations and CA in UL coming soon



1st in Data

opportunity for improvement on live web browsing reliability and live web browsing session time



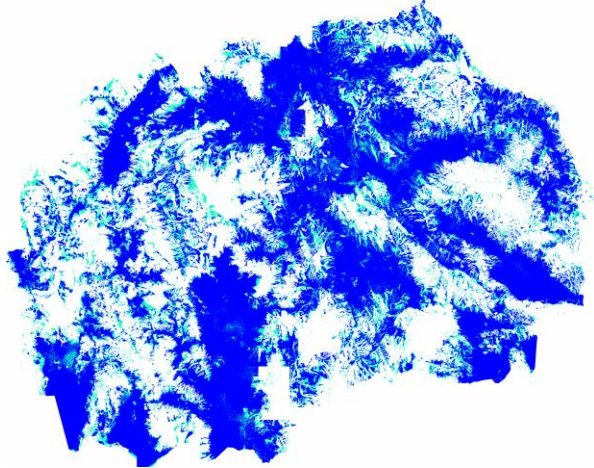
92% LTE CA Roll-out in cities

providing average downlink throughput of 58Mbps



4G+ and it's coverage

- Currently, maximum theoretical speeds are about 300Mbps where in live network speeds of ~150Mbps are achivable
- In the next period maximum theoretical DL speed will be ~670Mbps and UL speed of ~350Mbps while live network speeds are epected to be around ~300Mbps i DL and ~100Mbps in UL
 - All above is achievable with UE terminals of Category10 onwards
- 4G+ is available in all urban/suburban areas of Macedonia while „classic“ LTE is available country wide covering ~98% of the population



THANK YOU

