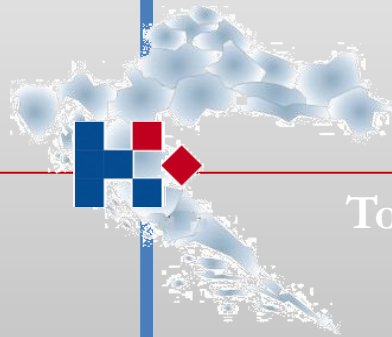


**CROATIAN REGULATORY
AUTHORITY FOR NETWORK
INDUSTRIES**
HAKOM

*Market analysis and their
effects on NGA development*



Tomislav Lovrić, Senior Market Analysis Expert

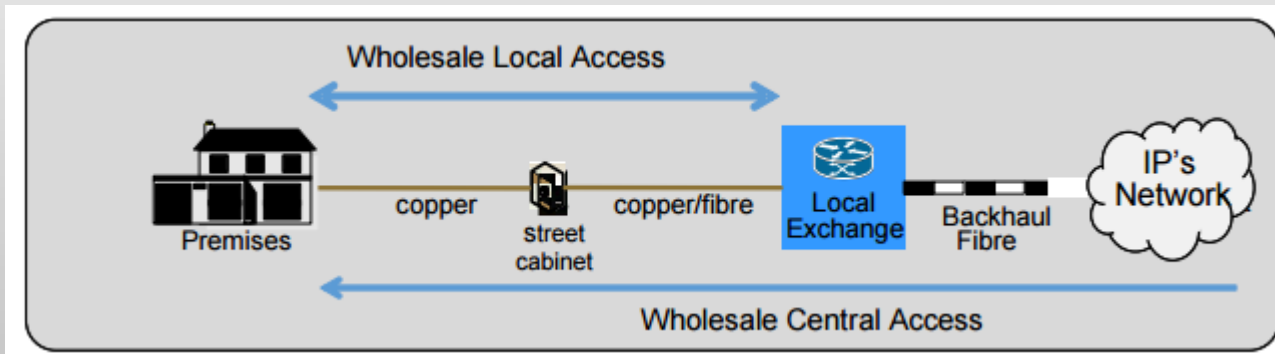


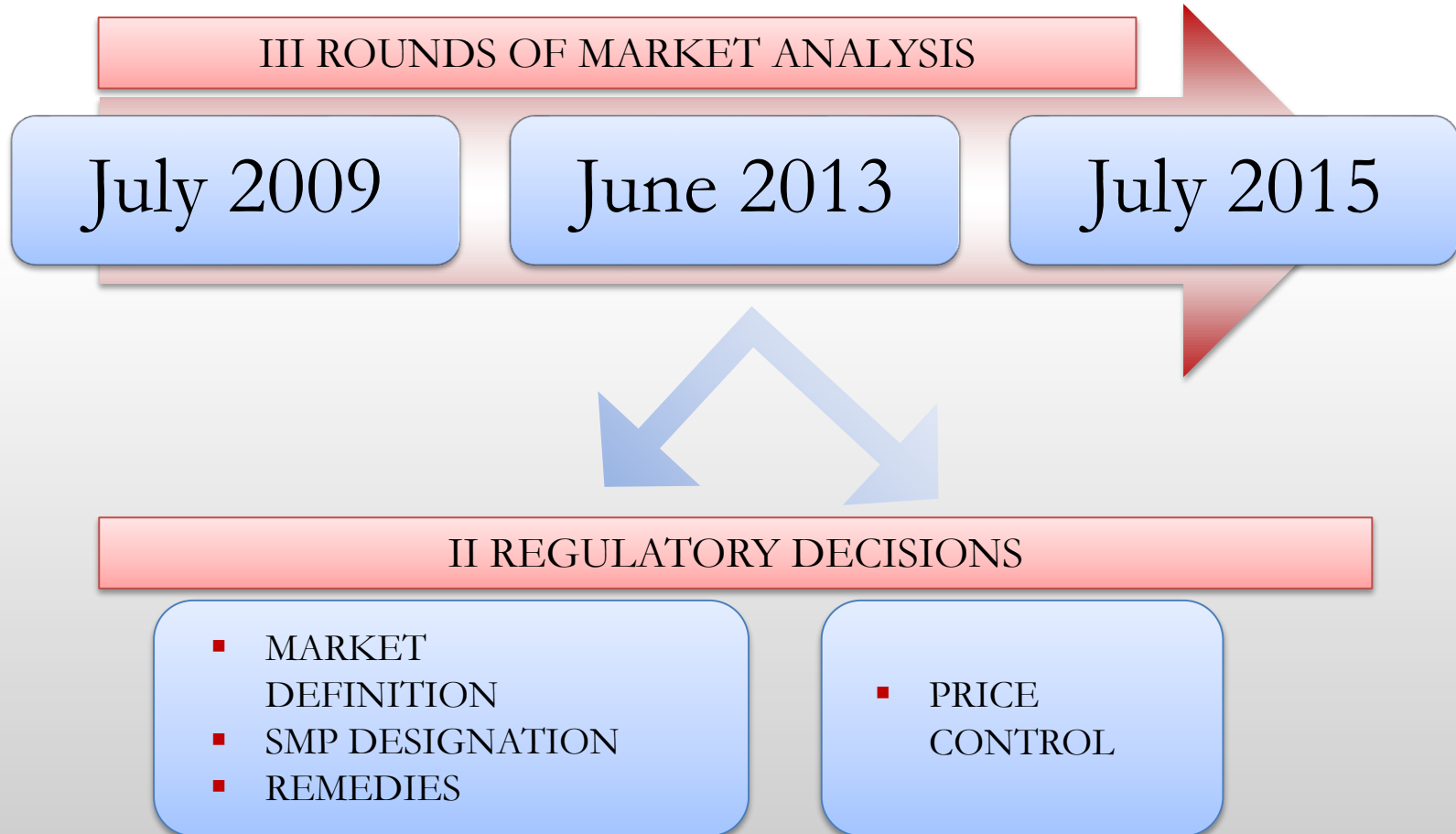
The EU defines two wholesale broadband markets that are subject to ex-ante regulation;

- ✓ Market 3a: **Wholesale local access provided at a fixed location**
- ✓ Market 3b: **Wholesale central access provided at a fixed location for mass-market products**

What are WLA and WCA?

WLA and WCA services are wholesale inputs used both directly and indirectly in the supply of a range of downstream wholesale and retail services, including (but not limited to) fixed telephone, broadband internet/connectivity, leased lines and television (“TV”) services, to residential and business End Users (“End Users”).





APPROACH TO MARKET REGULATION

WLA & WCA



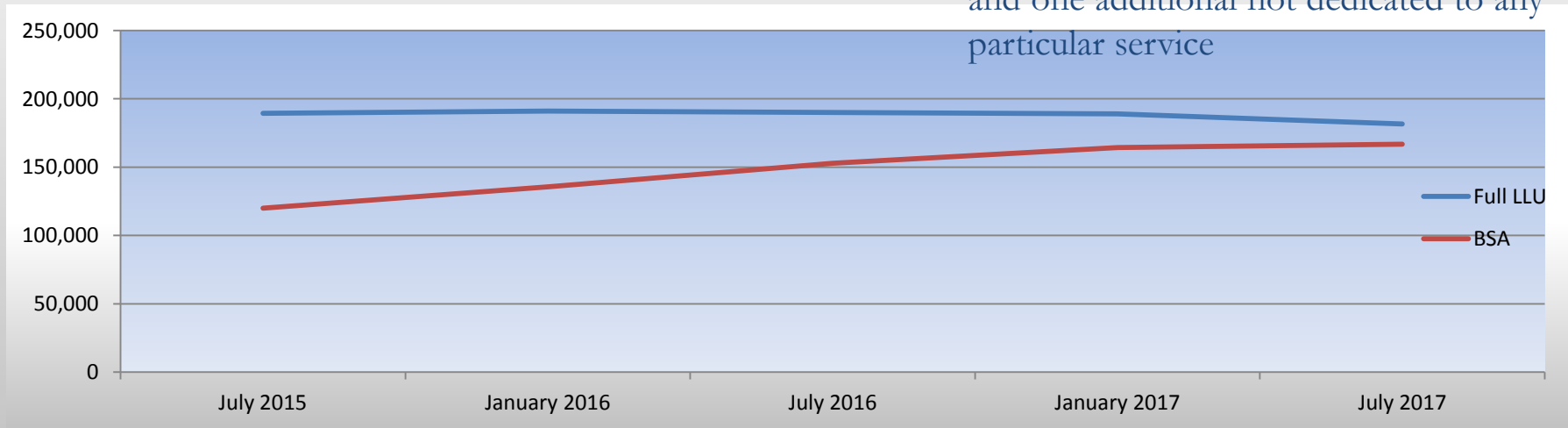
WLA access products

- ❖ Copper LLU at MDF
- ❖ Copper SLU at street cabinet
- ❖ Fibre access network (VULA, FA, fibre LLU)

SMP designation: Incumbent (HT)

WCA access products

- ❖ Bitstream/Naked Bitstream access independent of access technologies on:
 - IP level
 - Ethernet level
 - DSLAM/OLT level
- ❖ Separate virtual channels for VoIP, IPTV, end user equipment monitoring and one additional not dedicated to any particular service



APPROACH TO MARKET REGULATION

WHOLESALE CHARGES



Access product	Analysis 2013	Analysis 2015
ULL	7,69 € (5,85 €)	6,65 €
BSA	2,47 €	2,00 €
NBSA up to 30 Mbit/s	8,32 €	8,02€
NBSA above 30 Mbit/s	8,32 €	9,41 €
NBSA FTTH*	10,32 – 11,98 €	9,36 – 11,36 €
SD IPTV virtual channel	0,61 €	0,76 €
SD IPTV virtual channel	0,80 €	1,06 €

*volume discount which depends on number of lines at specific OLT area

APPROACH TO MARKET REGULATION

WHOLESALE CHARGES



- ADSL/VDSL based NBSA up to 30 Mbit/s – cost of copper LLU – wholesale specific LLU costs + DSLAM port price + wholesale specific costs for bitstream

$$6,02 \text{ EUR} + 2 \text{ EUR} = 8,02 \text{ EUR}$$

- FttX/VDSL based NBSA above 30 Mbit/s – FTTH access cost without risk premium + DSLAM port price + wholesale specific costs for bitstream

$$7,41 \text{ EUR} + 2 \text{ EUR} = 9,41 \text{ EUR}$$

- (N)BSA FTTH – FTTH access cost with risk premium + OLT port price + wholesale specific costs for bitstream

$$9,46 \text{ EUR} + 1,90 \text{ EUR} = 11,36 \text{ EUR}$$

ENABLERS REGULATORY DECISIONS

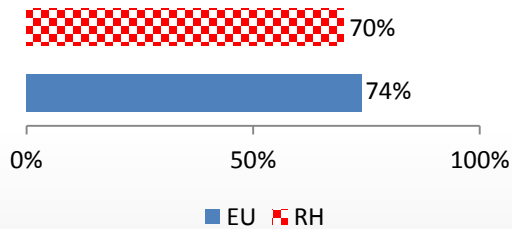


- ❖ HAKOM **defined new prices for wholesale broadband access based on FttH infrastructure** (2014 and 2015) – in practice HT's FttH network has not been used (high wholesale/retail prices); HAKOM made new decision in which lower wholesale prices were defined
- ❖ Beside FttH solution, **HAKOM supports other concepts as well, such as FttB/FttDP solution** – today HT and ISKON deploy FttB/FttDP infrastructure and in future they have plans to deploy G.fast technology. FttB/FttDP infrastructure is very practical in case when operator can't build in-building optical infrastructure
- ❖ December 2015 - HT switched off last LE, all users were **migrated to IP**
- ❖ September 2016. - in order to incentivise investments in FttX infrastructure, **HAKOM defined higher wholesale prices for wholesale broadband access** in the case when access seekers use speeds equal or higher than 30 Mbit/s over FttX infrastructure

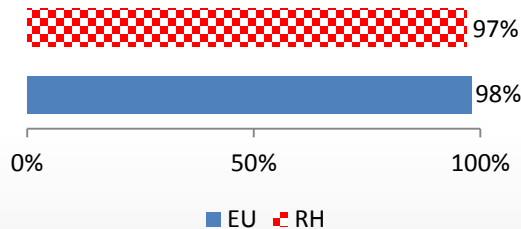
Fast broadband coverage and subscriptions have increased but are still below EU average



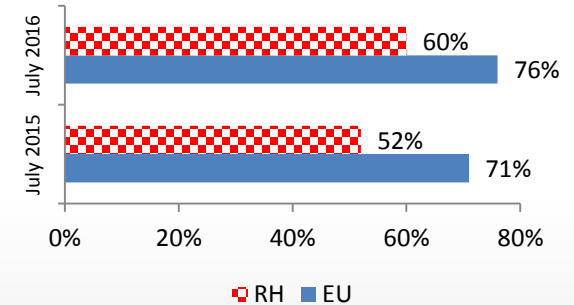
HOUSEHOLDS WITH FIXED BROADBAND CONNECTIONS, JULY 2016



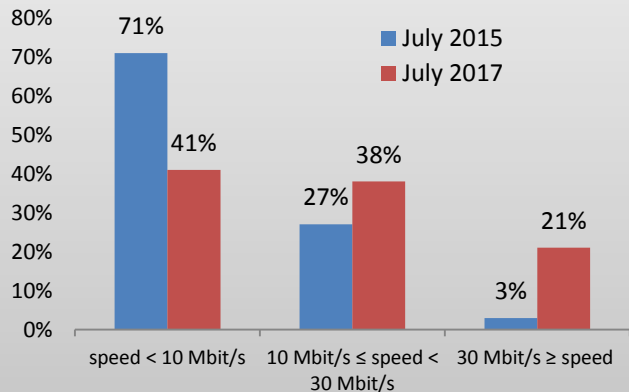
FIXED BROADBAND COVERAGE, JULY 2016



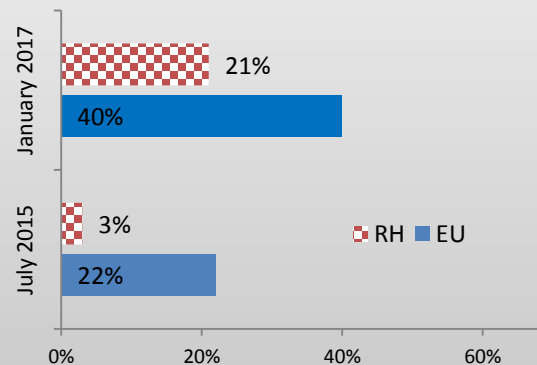
NGA BROADBAND COVERAGE



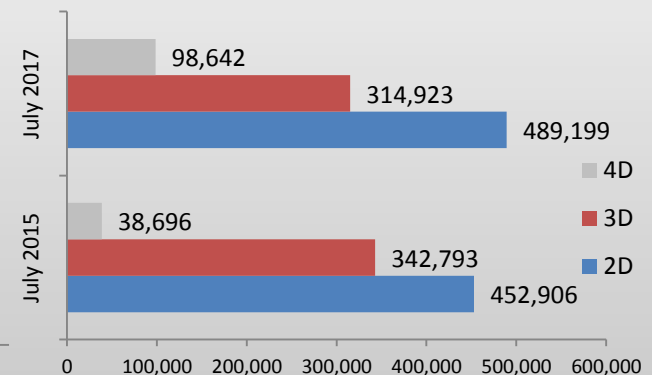
SHARE OF FIXED BROADBAND SUBSCRIPTIONS



SHARE OF FIXED BROADBAND SUBSCRIPTIONS



NUMBER OF BUNDLE SERVICES



RULES FOR SUCCESS IN NGA ROLLOUT



❖ Creating incentives for investments instead of regulation

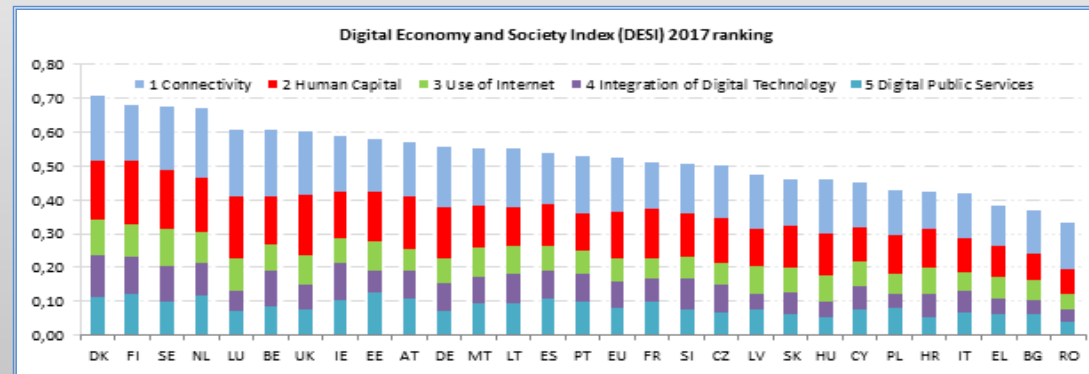
- *Education of local government*
- *Digital skills*
- *Use of Internet*

❖ Infrastructure based competition

- *Investments in fibre infrastructure*
- *From the beginning of 2017. announcement of 71 new networks; way more than in last 5 years*

❖ Involvement of the government

- *EU fond – HAKOM CAFT (Competent Authority for National Framework Program)*
- *BB cost Directive*
- *Digital literacy (E-Government, E-services...)*



TO CONCLUDE



*Consumer demand, technology and business models are all changing rapidly
We don't know what the future will look like, but everywhere we're going we
need high-speed broadband*

