Thriving in Harmony

Making the economic case for frequency harmonisation in Europe

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The spectrum debate is considering whether the concerns levelled at harmonisation can be addressed by a more liberalised approach

Overview of Spectrum Debate

Benefits of Harmonisation	Concerns over Harmonisation
‣ Minimises harmful interference and promotes spectrum efficiency and so increases spectrum use and competition ‣ Allows global circulation (mobility of terminals) and roaming ‣ Creates large equipment markets ‣ Promotes price competition between suppliers ‣ Ensures radio service penetration and interoperability between terminals and other networks – the "network effect" ‣ Promotes independent competition between market players at every layer of the architecture (network, end-user services and application suppliers) ‣ Allows more dynamic growth trajectory in the introduction of new end-user services ‣ Focuses R&D investment due to stable environment	‣ Restrictions on use (or trade) of underused spectrum for alternative uses ‣ Restrictions on the ability to re-farm spectrum ‣ Insufficient spectrum allocated to some end-user services ‣ Delays caused by time to agree harmonisation measures ‣ Restrictions on the use of equipment developed elsewhere, which may be cheaper or have greater functionality ‣ Less innovation and lock-in to a potentially inferior mandated standard ‣ Delays in the introduction of new services and equipment due to the time to agree standards and agree harmonisation measures ‣ Less flexibility in support of spectrum access for new market entrants

Goals of Study

- Provide the end-to-end view on this complex debate
- Assist the regulatory process with a differing perspective to that of liberalisation as a key driver for continued European market success and prosperity

Source: Indepen and Aegis study, and Booz Allen Hamilton analysis

The analysis compares two alternative spectrum proposition scenarios

Alternative Spectrum Use Proposition Scenarios – Definitions

Spectrum Harmonisation

- Pro-active regulatory approach to manage access to spectrum bands with defined requirements
- Dedicated bands linked to defined radio services nationally, regionally or globally
- Designated group of technology standards required for the use of a particular band (also nationally, regionally or globally)

Basecase for analysis

Spectrum Liberalisation

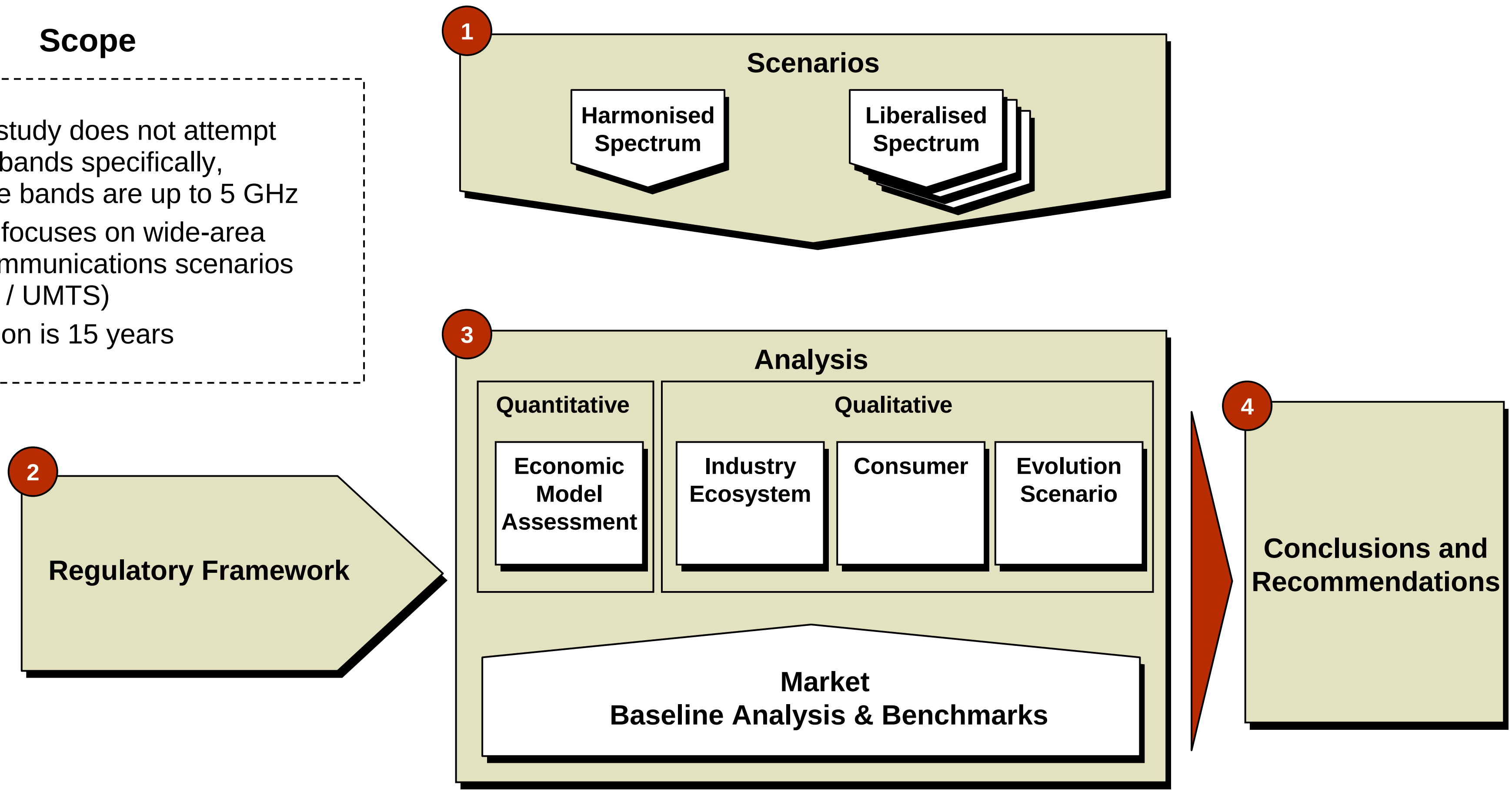
- Re-active, market-driven approach to spectrum management
- Spectrum is liberally licensed to users with little or no pre-conditions
- Technology agnostic: total freedom on technology "generalised technology neutrality" (nationally or regionally)

Spectrum Liberalisation Case (including a sensitivity analysis of penetration of new end-user services)

The spectrum use proposition analysis contains four components

Scope

- While the study does not attempt to identify bands specifically, appropriate bands are up to 5 GHz
- The study focuses on wide-area cellular communications scenarios (e.g. GSM / UMTS)
- Time horizon is 15 years



The qualitative assessment of the eco-system provides the input to the scenario analysis

- Consumer
- Network Operators
- Licences
- Interconnect
- Terminals
- Infrastructure
- IPR

Overview of Quantitative Scenarios Analysed

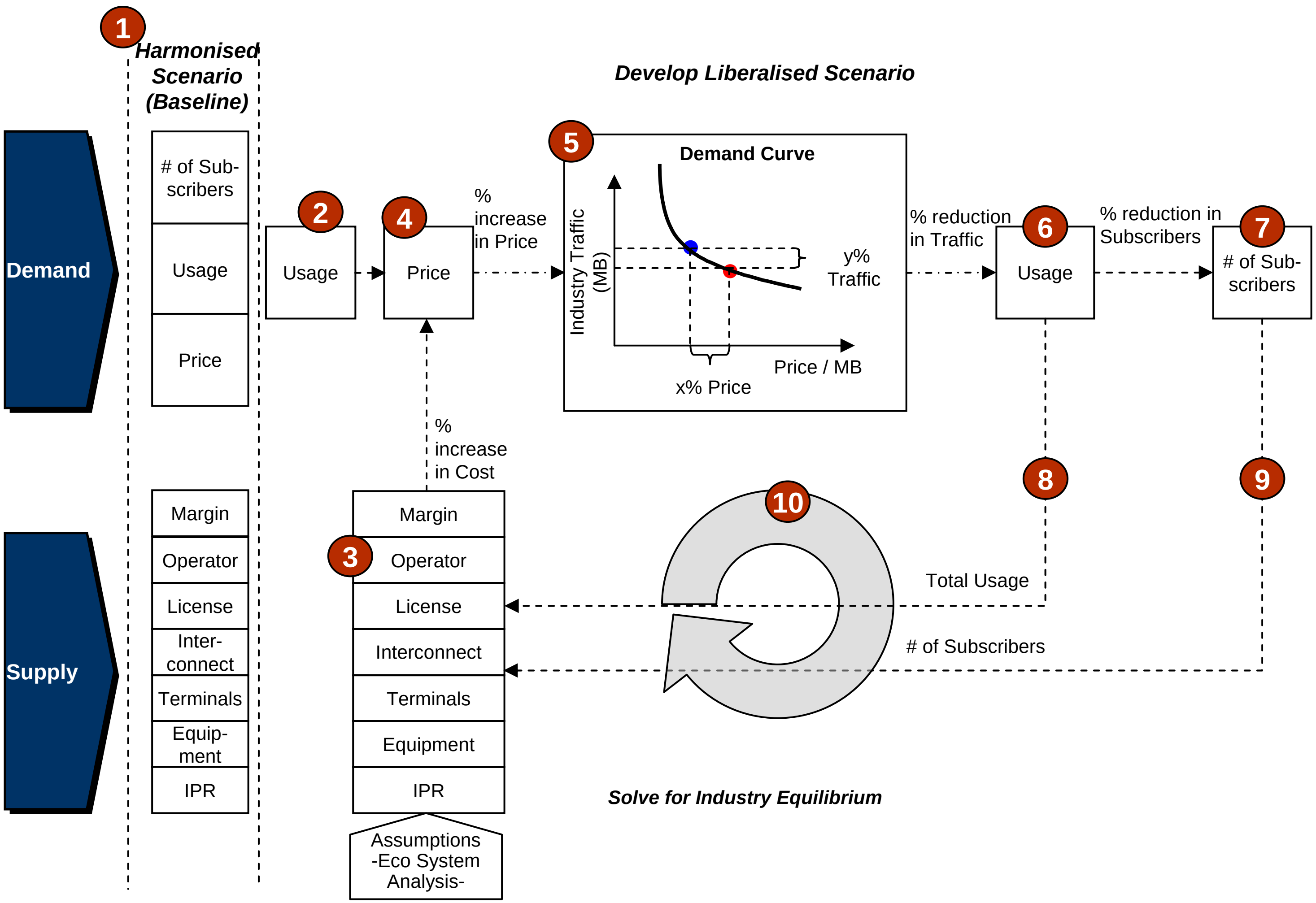
Harmonised Base Case	▸ Industry forecast figures provide the basecase ▸ Only transport of traffic is considered in the revenue forecasts (excludes service / application related revenues)
Liberalised Case	▸ Liberalised cost impact is phased in over time ▸ No change to market environment

The analysis considers the key constituents of the industry value chain

Overview of Industry Value Chain

Consumer	▸ Determines the overall value of the eco-system through usage, price-paid and penetration	***Consumer Analysis***
Network Operators	▸ Value captured by operators to provide services to end-users, either directly, or via indirect channels (e.g. MVNOs and service providers) ▸ Only the network environment is considered, as the focus of the study is the radio layer	***Industry Ecosystem Analysis***
Licences	▸ Value of spectrum captured by governments ▸ Licences are considered to apply in both scenarios	
Interconnect	▸ Value associated with transit of traffic and termination of traffic on non-mobile networks	
Terminals	▸ Value of end-user terminals, captured by terminal vendors	
Infrastructure	▸ Value of network infrastructure, captured by network infrastructure vendors	
IPR	▸ Mechanism to recuperate R&D investments – either captured via IPR royalties or infrastructure / terminal sales for traditional manufacturers	

The quantitative scenario analysis employs the Extended Intelligent Simulation Methodology



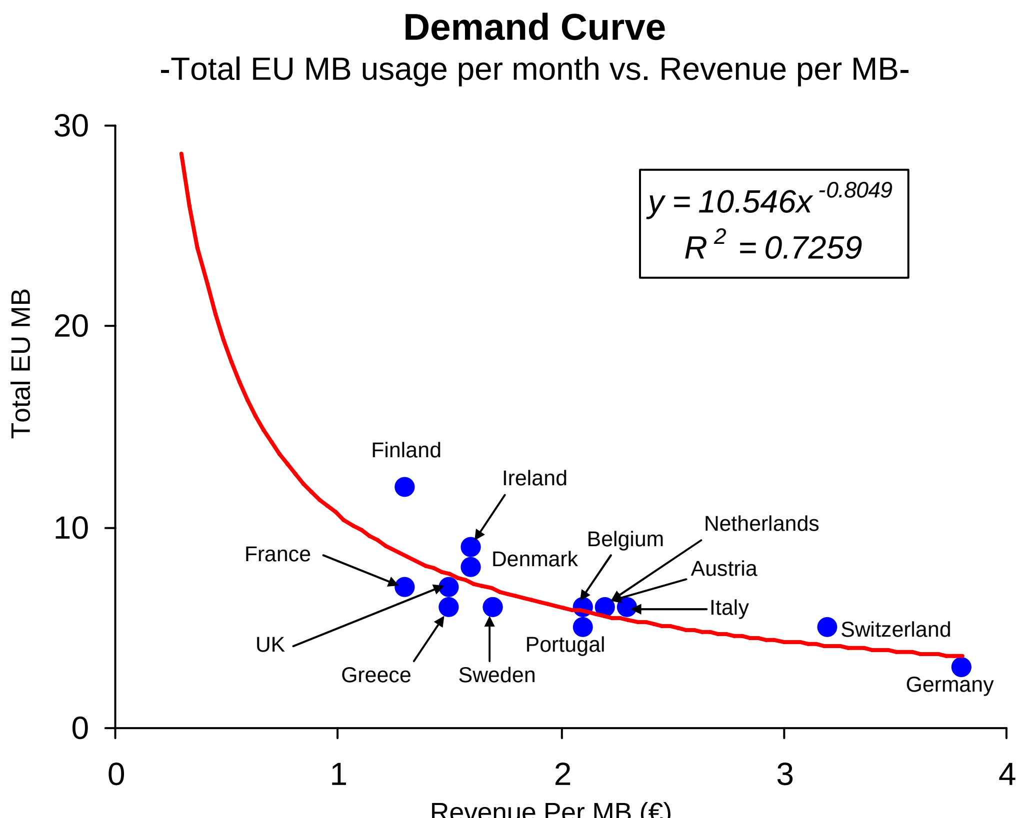
Implications

1. Develop baseline for supply and demand evolution in a harmonised environment
2. Establish usage level in liberalised case based on innovation delay
3. Build increase in industry costs due to lack of scale and interference
4. Develop liberalised pricing based on increased costs and margin
5. Identify impact of increased pricing on industry consumption using demand curve
6. Validate industry usage level in given year, based on the percentage change in usage on today's demand curve
7. Model reduction in subscribers due to reduced industry usage
8. Reflect change in industry usage back onto the cost structure
9. Reflect change in subscribers back onto cost structure
10. Iterate for industry equilibrium, where industry costs support industry usage and prices

The consumer impact of liberalisation is modelled using a mobile industry demand curve for Western Europe

Mobile Industry Demand Curve

Overview



Comments

- A range of countries across the European-15 countries have been used to establish a demand curve that is used to model the effects of changing price on usage
- The gradient of the demand curve is assumed to remain constant throughout the analysis period
- It is anticipated that the demand curve will move upward over time – i.e. as the market develops and new end-user services are brought to market the usage level for any given price point will increase over time
- The modelling approach will compensate for this effect by using the percentage change in usage at any price point to drive the model

(1) Note: IDC, 2006, Booz Allen Hamilton analysis

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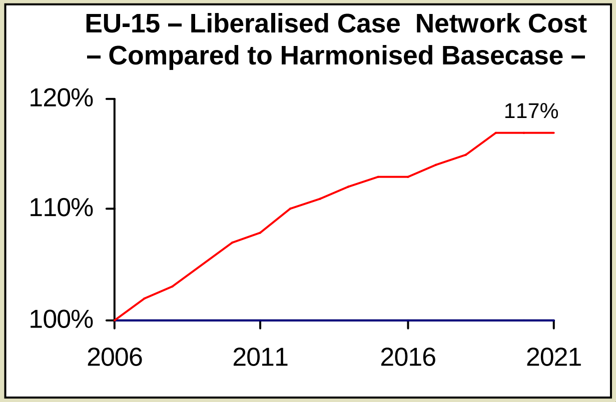
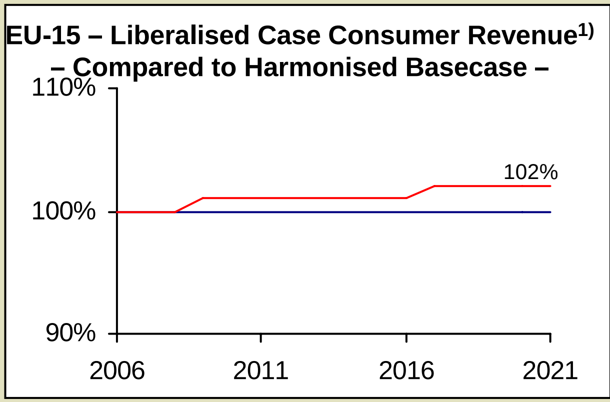
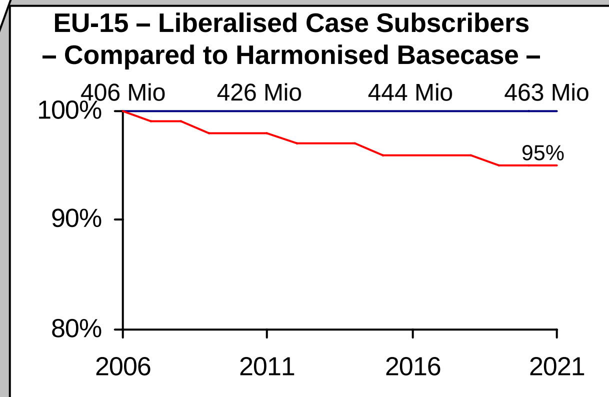
The liberalised case – detailed results compared to the harmonised base case

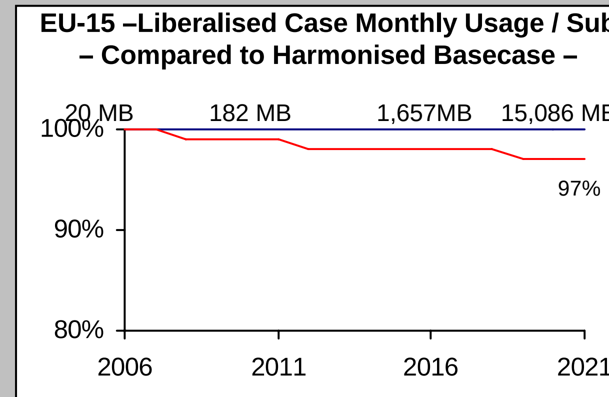
Summary

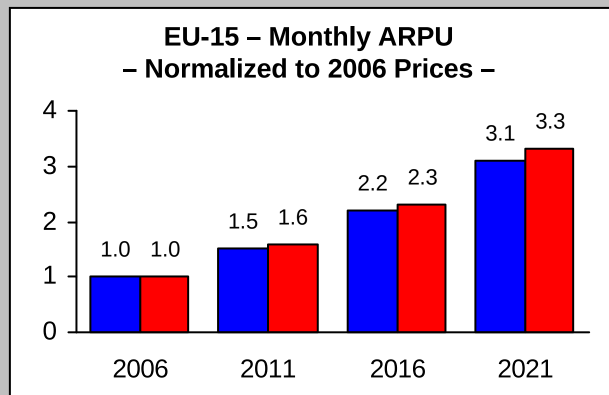


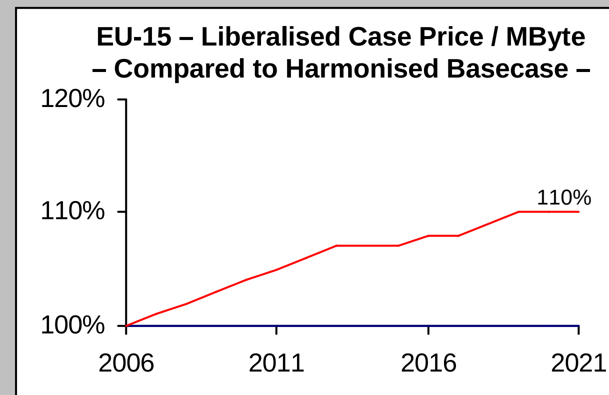


Breakdown









Harmonised Case | Liberalised Case

(1) Note: Inflation is included

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The economic scenario analysis indicates a tangible upside for the harmonised case, based on consumers and overall industry benefits

Impact of Liberalised Scenarios Compared to Harmonised Baseline

	Consumer Indices				Industry / Consumer Ecosystem Indicators		
	Usage / Sub[1)]	ARPU[1)]	Penetration[1)]	Consumer Surplus[2)]	Consumer Revenue[1)]	Industry Usage[4)]	Industry Cost[5)]
Liberalised Case (Variation in absolute terms compared to Harmonised Case)	-3%	7%	-5%	-€244 bn (-5%)[3)]	2%	-7%	17%
Liberalised Case (Variation in growth from 2006 compared to Harmonised Case)	-3%	10%	-37%	-€244 bn (-5%)[3)]	3%	-7%	23%

(1) Note: Percentage change compared to harmonised basecase by 2021

(2) Note: Consumer Surplus shows the cumulative change in consumer surplus compared to basecase over 15 years (2006 -2021)

(3) Note: Consumer Surplus as percentage of scenario consumer revenue over 15 years (2006 -2021)

(4) Note: Industry usage shows the percentage change in mobile industry traffic level, in the EU-15 by 2021, compared to the harmonised basecase

(5) Note: Industry cost shows the percentage change in mobile industry cost level, in the EU-15 by 2021, compared to the harmonised basecase

Overall, the quantitative and qualitative assessments favours the continuation of the harmonised approach to spectrum management

Quantitative Results

- Harmonisation provides a greater benefit to consumers than liberalisation
  - 3% greater usage per subscriber
  - 5% higher in end-user service penetration
  - €244bn greater consumer surplus over the 15 year analysis period
- Harmonisation has a superior cost position: the cost structure of the industry eco-system is 17% lower than the liberalised case
- Considering the impact of a delay in the introduction of new end-user services on the liberalised case, results in further upside in favour of harmonisation, which includes: 8% greater usage per subscriber and 4% less mobile industry revenue compared to the liberalised scenario

Qualitative Results

Consumer Benefits

- More rapid introduction of new innovations
- Increased service continuity and cross-boarder roaming
- Greater penetration of new end-user services

Industry Eco-system Benefits

- Increased financial stability encouraging investment
- Increased industry scale – enabling lower industry cost structure
- Reduced interference management costs
- Layered architecture stimulating new entrants and competitive dynamics

UMTS Forum

„neither political objectives nor economic theory can change the laws of physics“

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