THE FUTURE OF WIRELESS NETWORKING

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CTO Alcatel-Lucent

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WHAT IS **REALLY** DRIVING THE (WIRELESS) MARKET ?

WHERE IS THE **REAL** VALUE ?

THE NEW **REALITY**

WHAT IS **REALLY** DRIVING THE (WIRELESS) MARKET ?

THE TABLET GENERATION IS IN COMMAND

67%
Would cut anything but **Mobile BB** (UK)

70%
Mobile-only Web users in emerging markets

100%
Broadband users **microblog** (China)

500M+
Users/month on **Facebook** apps platform

84%
Choose **Internet** over partner or car (Germany)

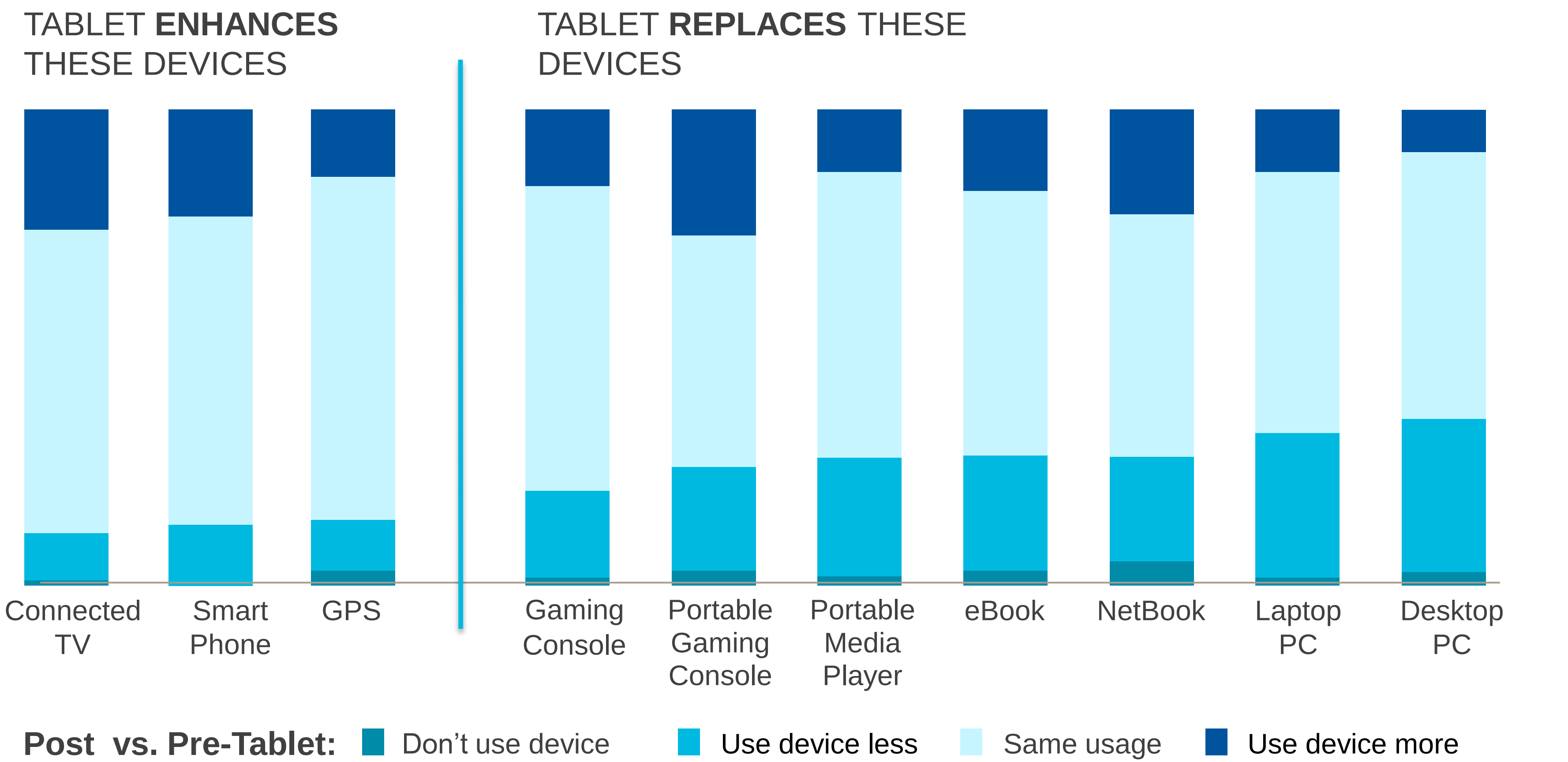
11.5
Content hours in 7hrs by 8-18 years old (USA)

66%
Sleep with **smart phone** (USA)

100M+
Tablets sold in 2012 globally

USERS KNOW WHAT THEY WANT AND HOW IT SHOULD BE DELIVERED

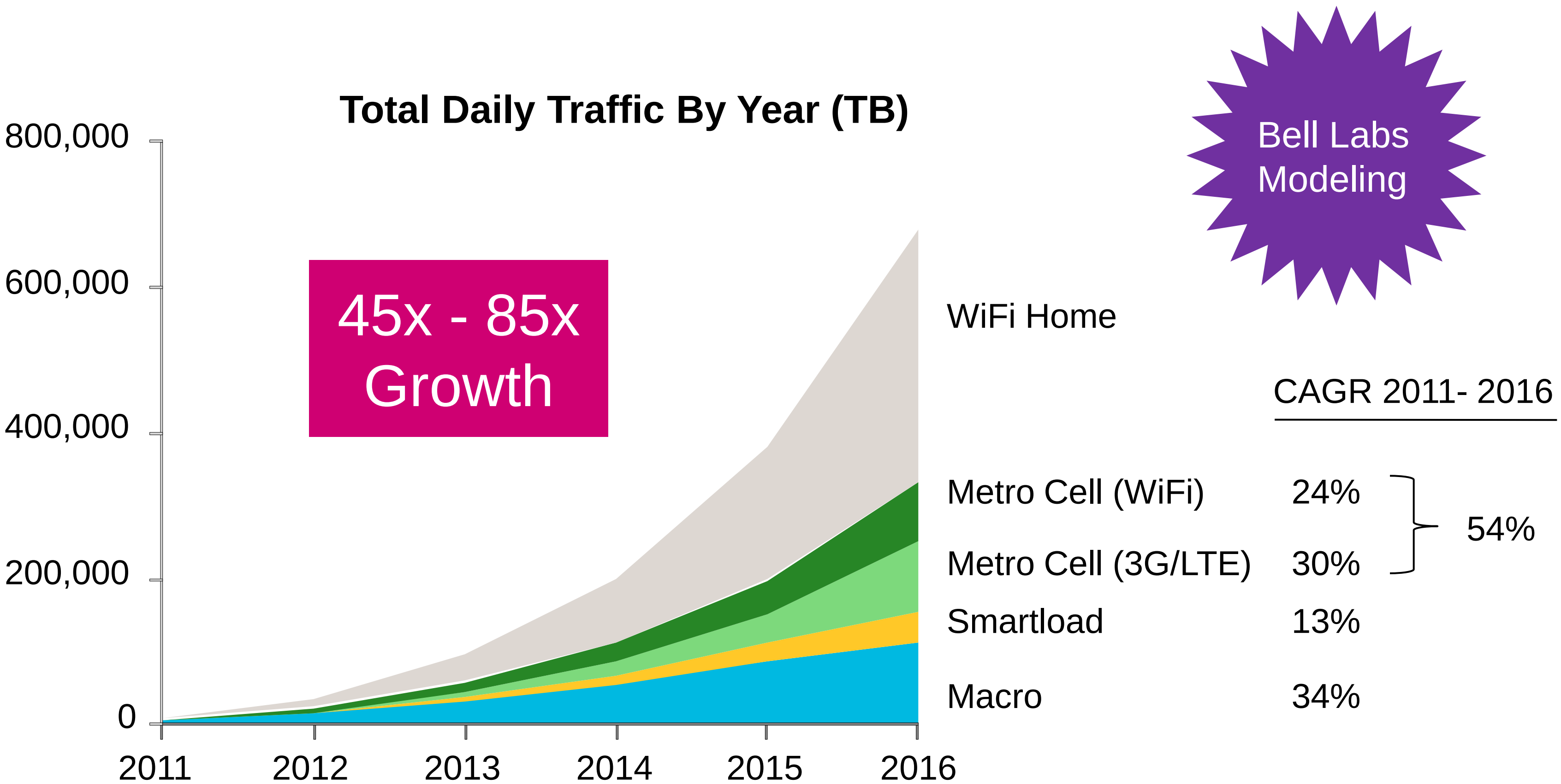
THE TABLET VERSUS. . . EVERYTHING ELSE



LIFE CONVERGENCE: WORK/HOME, CELL/WIFI, EVERYTHING EVERYWHERE

Source: The Nielsen Company

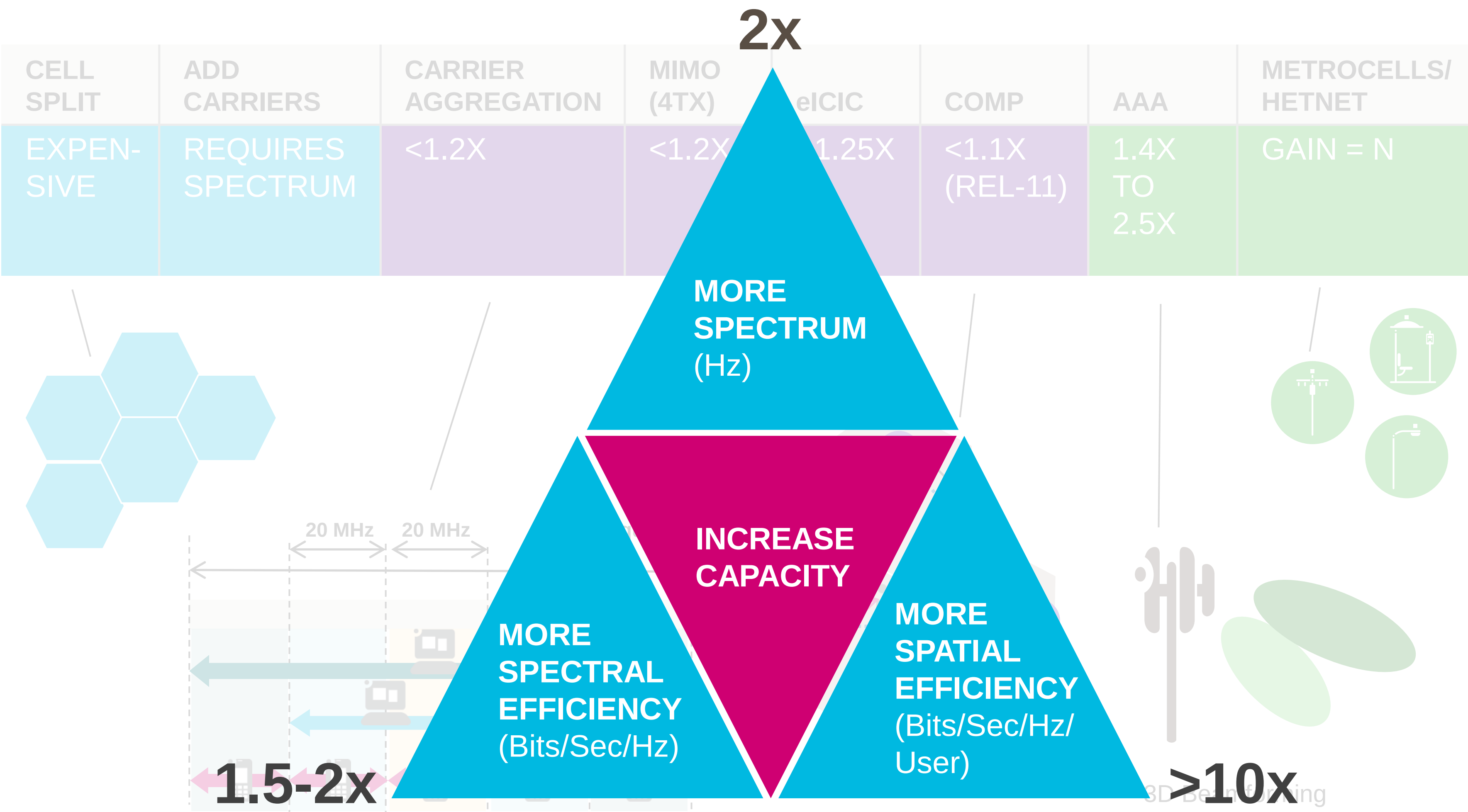
THE NET EFFECT:
THIS IS VERY DEMANDING



MASSIVE GROWTH IN DEMAND REQUIRES NEW SUPPLY STRATEGY

THE SUPPLY LEVERS:
RADIO CAPACITY

CELL SPLIT	ADD CARRIERS	CARRIER AGGREGATION	MIMO (4TX)	eICIC	COMP	AAA	METROCELLS/ HETNET
EXPEN-SIVE	REQUIRES SPECTRUM	<1.2X	<1.2X	1.25X	<1.1X (REL-11)	1.4X TO 2.5X	GAIN = N



WHAT IS THE IMPACT FOR OPERATORS?

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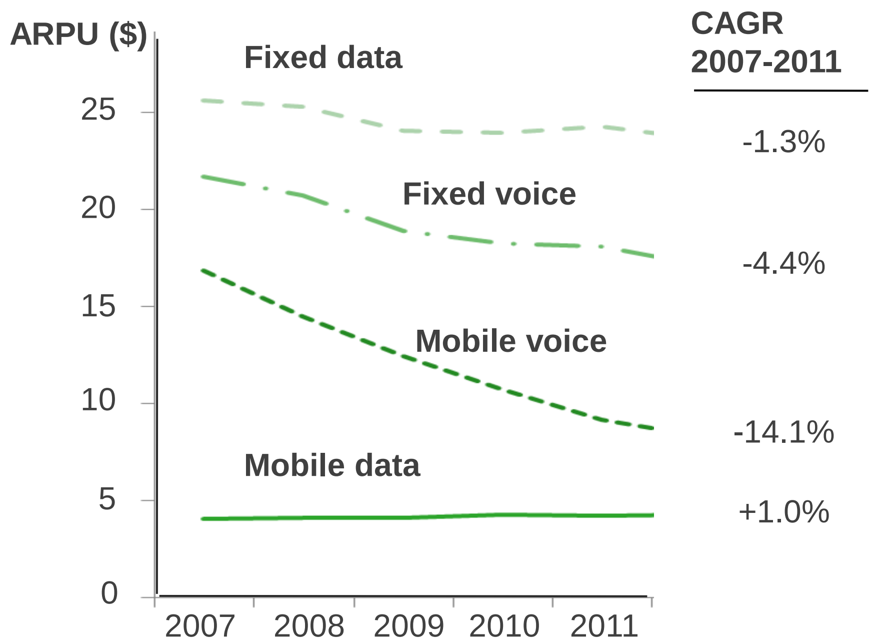
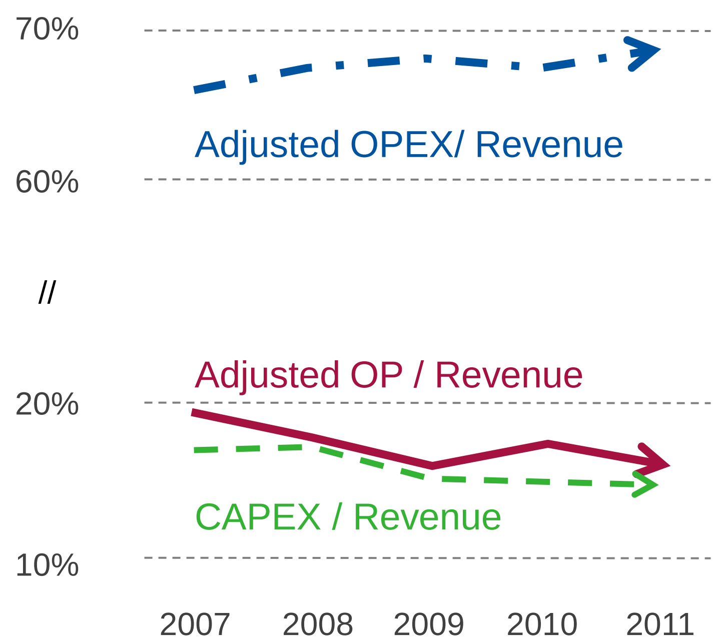
OPERATORS HAVE NOT CAPTURED THE FULL VALUE

OPERATORS CONSUMER REVENUES



+2.5% WW revenue: ARPU decline offset by more subs.

OPERATORS COSTS AND PROFITS



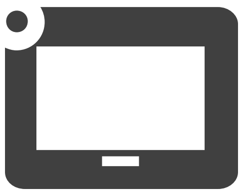
High pressure on CAPEX to control OP

UNLOCK THE NETWORK VALUE TO MEET THE USER DEMAND

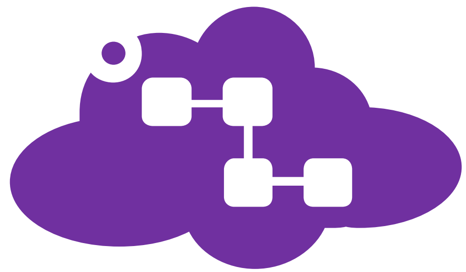
Source: Alcatel-Lucent analysis

WHERE IS THE **REAL** VALUE ?

THE ESSENTIAL BRIDGE BETWEEN HAND AND CONTENT



Handheld



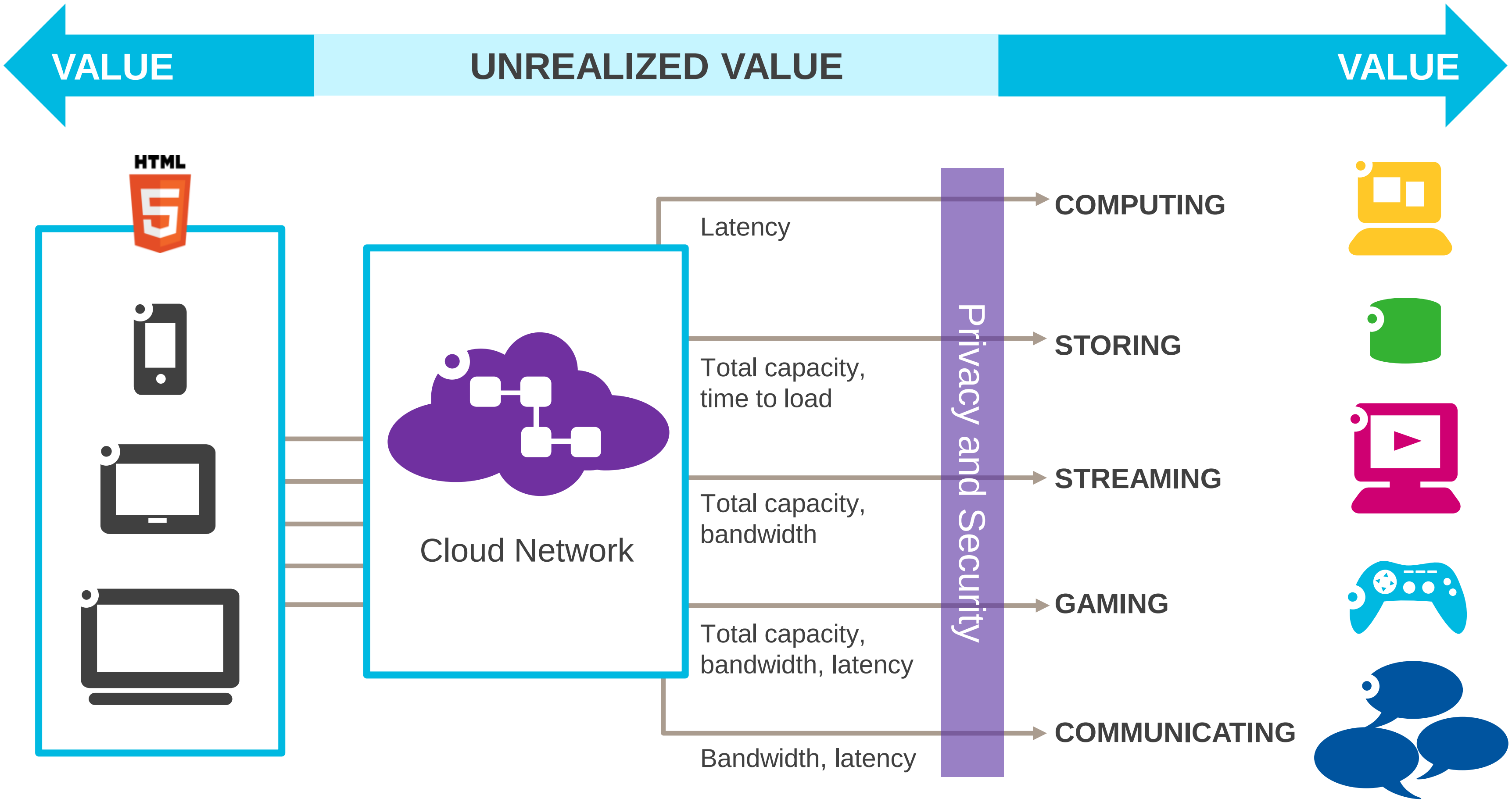
Cloud Network

Content in cloud

BEST EXPERIENCE | **BEST DELIVERY** | **BEST MEDIA AND APPS**

THREE DISTINCT FUNCTIONS BUT A SINGLE UNIVERSE

THE NETWORK IS AT THE EPICENTER AND MATTERS MORE THAN EVER



THE NETWORK (AND THE OPERATOR) IS CRITICAL TO THE EXPERIENCE

THE NEW **REALITY**

THE PROFOUND SHIFT DRIVES GLOBAL GROWTH

"ANALOG" ECONOMY

VERTICALIZED SECTORS

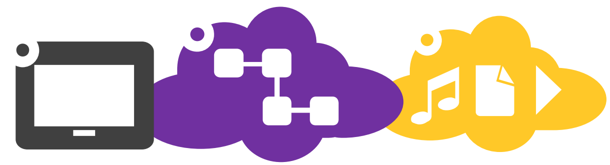
- Disconnected
- Unit of mass markets
- Subscriptions, brand loyalty
- Hardware-Defined
- Proximity-based groups
- Independent economies
- Innovation timescale = years

"DIGITAL" ECONOMY

PARTIAL RE-CONSTRUCTION TO DIGITAL INDUSTRIES

- Connected
- Unit of family, friends, colleagues
- Digital cannibalization
- Software-Defined
- Rise of virtual social groups
- Interdependent markets
- Innovation timescale = months

"NEXT DIGITAL" ECONOMY

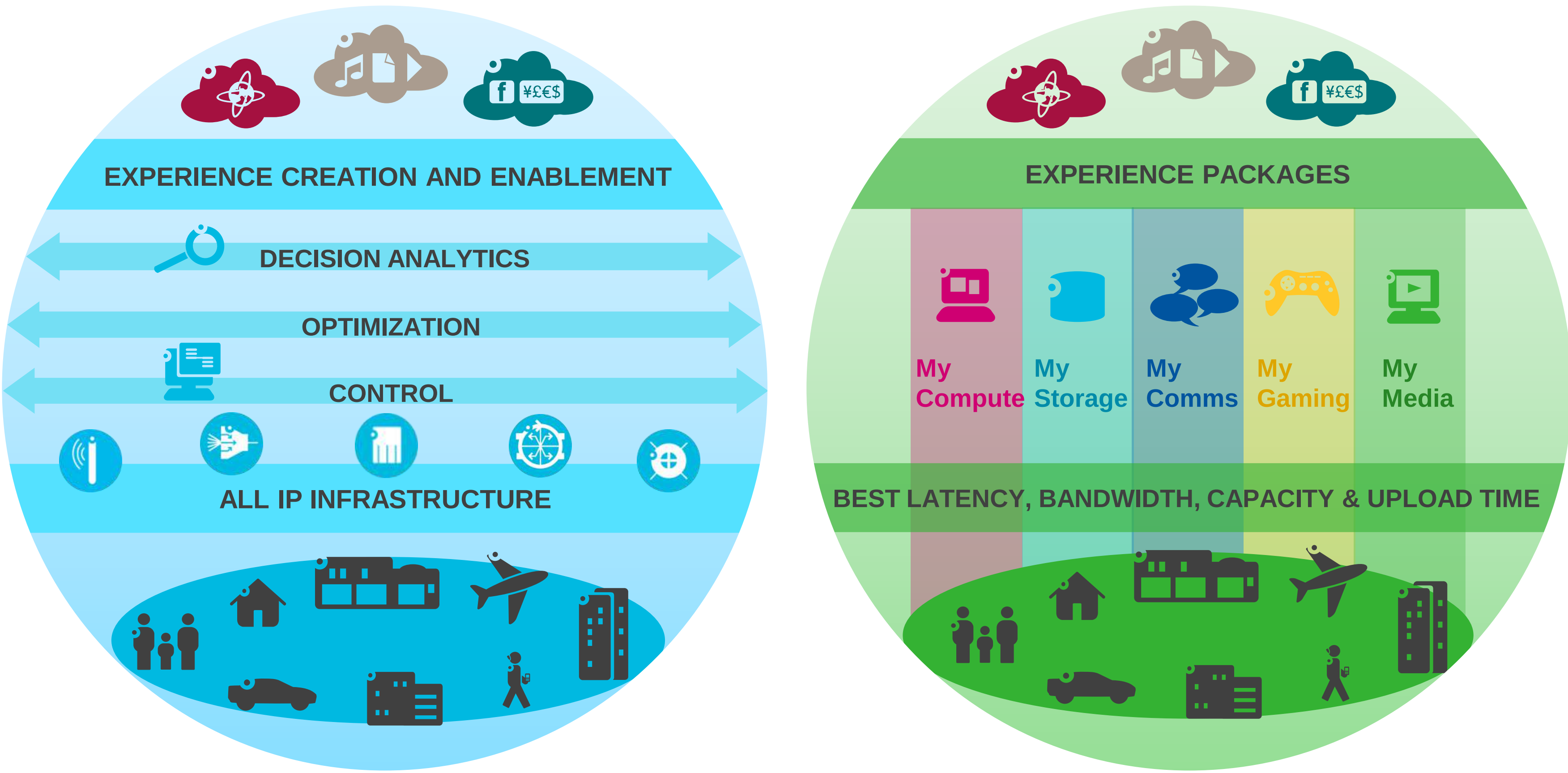


DEEP SOCIETAL CHANGE

- **Hyper-connected**
- **Unit of one,** highly empowered
- **A-la-carte** user experience
- **Application-Driven**
- **Virtual** global communities dominate
- **Global** market and economy
- Innovation timescale = **days**

USER ARE MAKING THE MOVE, ARE WE READY?

THE FUTURE OF NETWORKS
A PLATFORM FOR EXPERIENCE INNOVATION



ARTIFICIAL INTELLIGENCE BUILT ON AND IN THE NETWORK

THE FUTURE OF NETWORKS: WHERE'S THE MONEY?

Addressable Market For Re-Imagination – Aggregate Market Cap of Global Public Companies = $36+ Trillion*

	2012 Market Cap ($B)	2011 Revenue ($B)	2011 EBITDA ($B)	Top Companies by Mkt Cap
Financials	$6,855	$4,647	$1,035	ICBC, China Construction Bank, Wells Fargo
Consumer Staples	4,386	3,972	543	Wal-Mart, Nestle, P&G, Coca-Cola
Information Technology	3,966	2,298	422	Apple, Microsoft, IBM, Google, Samsung
Energy	3,926	6,652	1,068	Exxon Mobil, PetroChina, Shell, Chevron
Consumer Discretionary	3,734	4,734	624	Toyota, Amazon.com, McDonald's, Walt Disney
Health Care	3,380	2,204	455	Johnson & Johnson, Pfizer, Roche, Novartis
Industrials	3,198	4,407	608	General Electric, Siemens, UPS
Materials	3,129	2,607	712	BHP Billiton, Rio Tinto, Vale
Telecommunication Services	2,572	2,045	699	China Mobile, AT&T, Telefonica, Vodafone
Utilities	1,188	1,501	315	GDF Suez, National Grid, E.ON, EDF
Total	$36,335	$35,066	$6,483	

Source: Mary Meeker, KPCB, Internet Trends 2012

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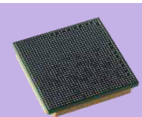
THE CONSTANT DRIVE IN NETWORKING
MORE EFFICIENCY, LESS SPACE, LESS ENERGY

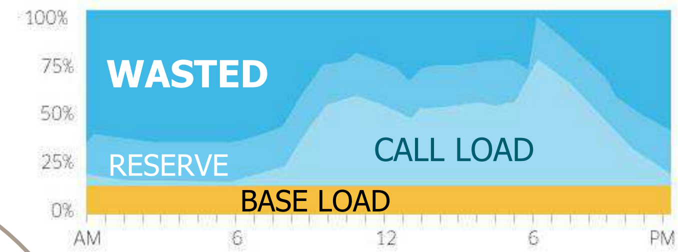
Compared to 100G systems

4 X SPEED



4 X	>2.6 X	-33%
DENSITY	CAPACITY	POWER

400G PIC



IMS core utilization

VIRTUALIZATION (GPP)

~ 40% less CAPACITY needed

IP CORE LEGACY

POWER	4x less
WEIGHT	10x less
SPACE	7x less

400G NP

Over past 7 years

DSL

POWER/Mbps	-54%
DENSITY	3 X

VECTORING ASIC

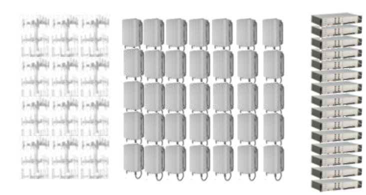
MIGRATION:
COPPER TO FIBER

GPON

POWER/Gbps	-58%
DENSITY	8 X

POWER/Gbps	-75%
DENSITY	10 X

LEGACY RAN



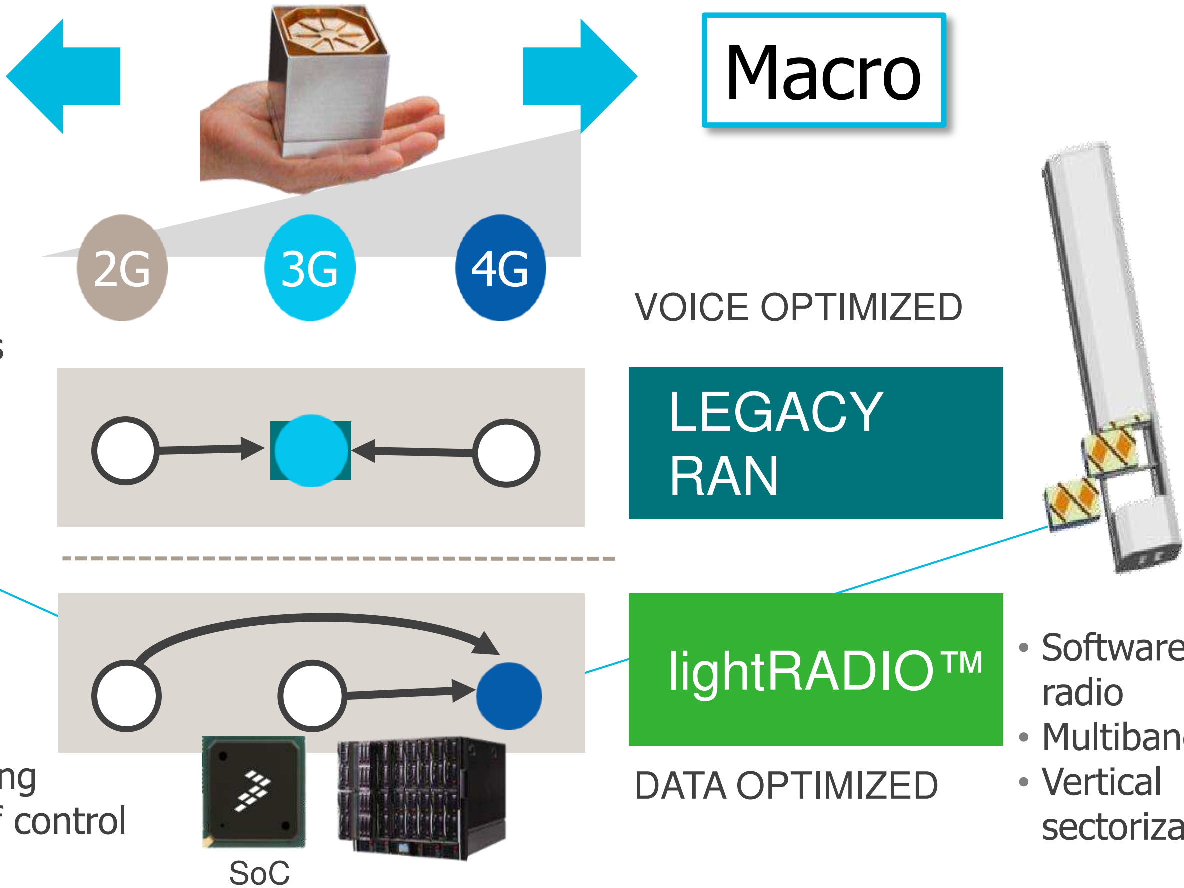
ANYG SOC

POWER SAVING	-42%
TCO SAVING	-51%

SYSTEMATICALLY PUSHING TECHNOLOGY LIMITS

THE FUTURE OF WIRELESS IS BIG & SMALL
LTE MACRO ‘OVERLAY’ AND ‘UNDERLAY’

- Software-defined radio
- Wideband antennas
- Adaptive RF beams



- AnyG baseband
- Baseband pooling
- Virtualization of control

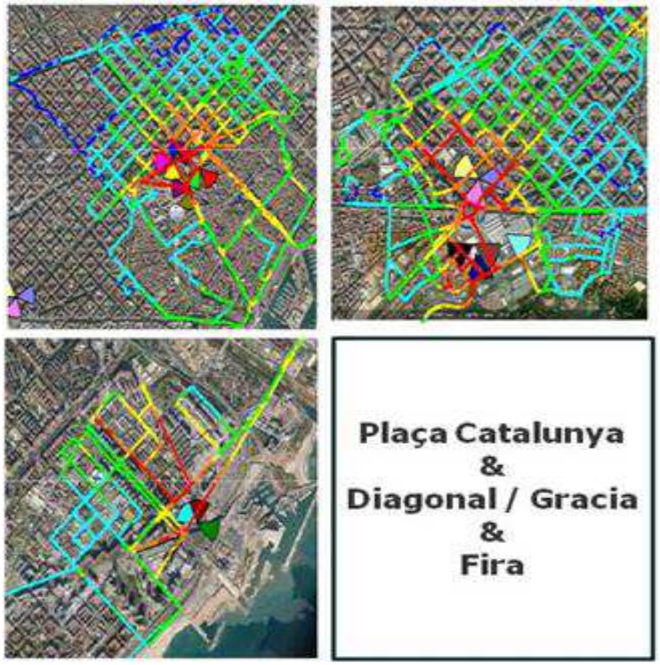
- Software-defined radio
- Multiband antennas
- Vertical sectorization

NEW 4G PLATFORMS DRIVE LOWER TCO FOR MACRO AND METRO

THE FUTURE OF WIRELESS IS BIG & SMALL
LTE METRO ‘UNDERLAY’ EXAMPLE

Delivering high capacity (100 Mbps down, 40 Mbps up) across central Barcelona

MACRO (51 Sectors)



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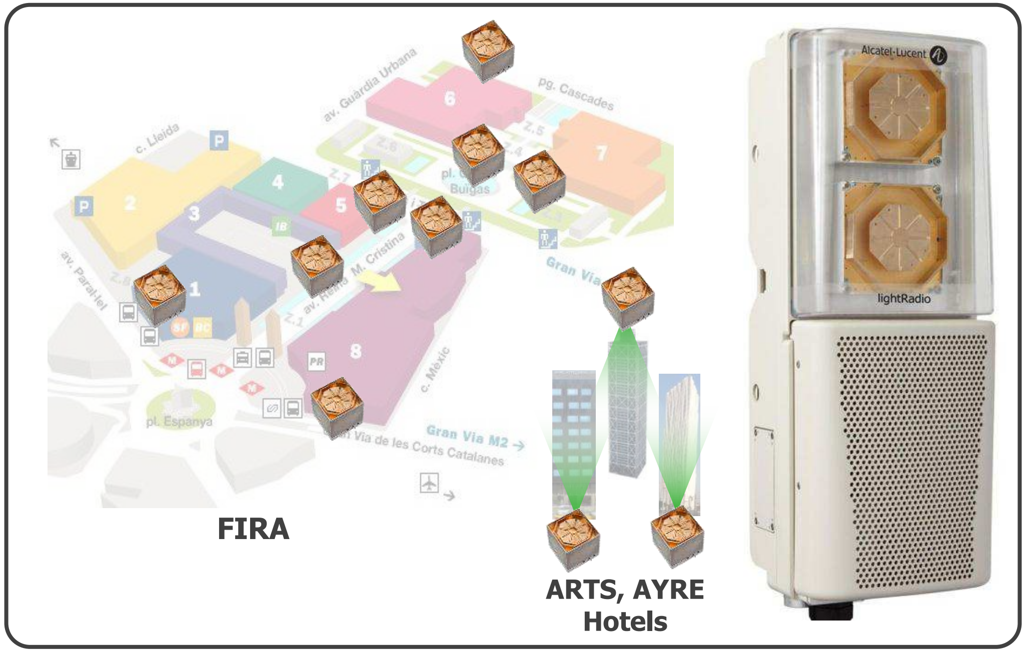
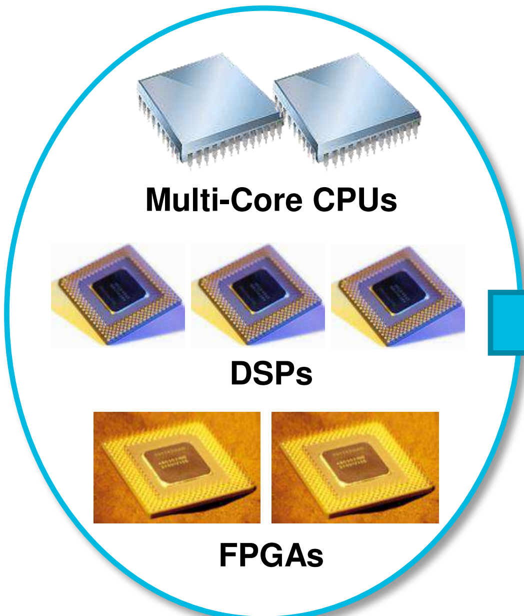
METRO (11 Sectors)



400% CAPACITY INCREASE, 40% TCO SAVINGS, 35% LESS POWER

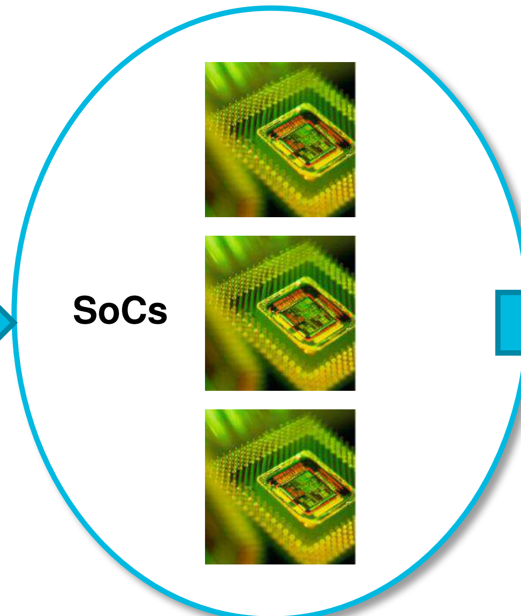
RADIO BASEBAND PROCESSING EVOLUTION
MORE EFFICIENCY, LESS SPACE, LESS ENERGY

2010 Design
Discrete L1, L2, L3 Processors



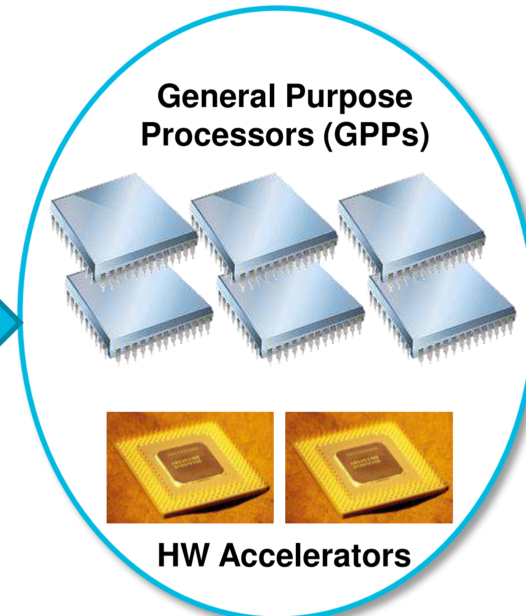
- FPGAs : L1 (PHY, Turbo Decoders,..)
- DSPs: L1 (Channel Estimation,.), and L2 (RLC/MAC, Scheduler,..)
- CPUs: L2, L3 (Transport, Security,..)

2012 Design
System On a Chip (SoC) Integrated L1, L2, L3



- HW Accelerators: L1
- Multi-Core DSPs: L1, L2
- Multi-Core CPUs: L2, L3

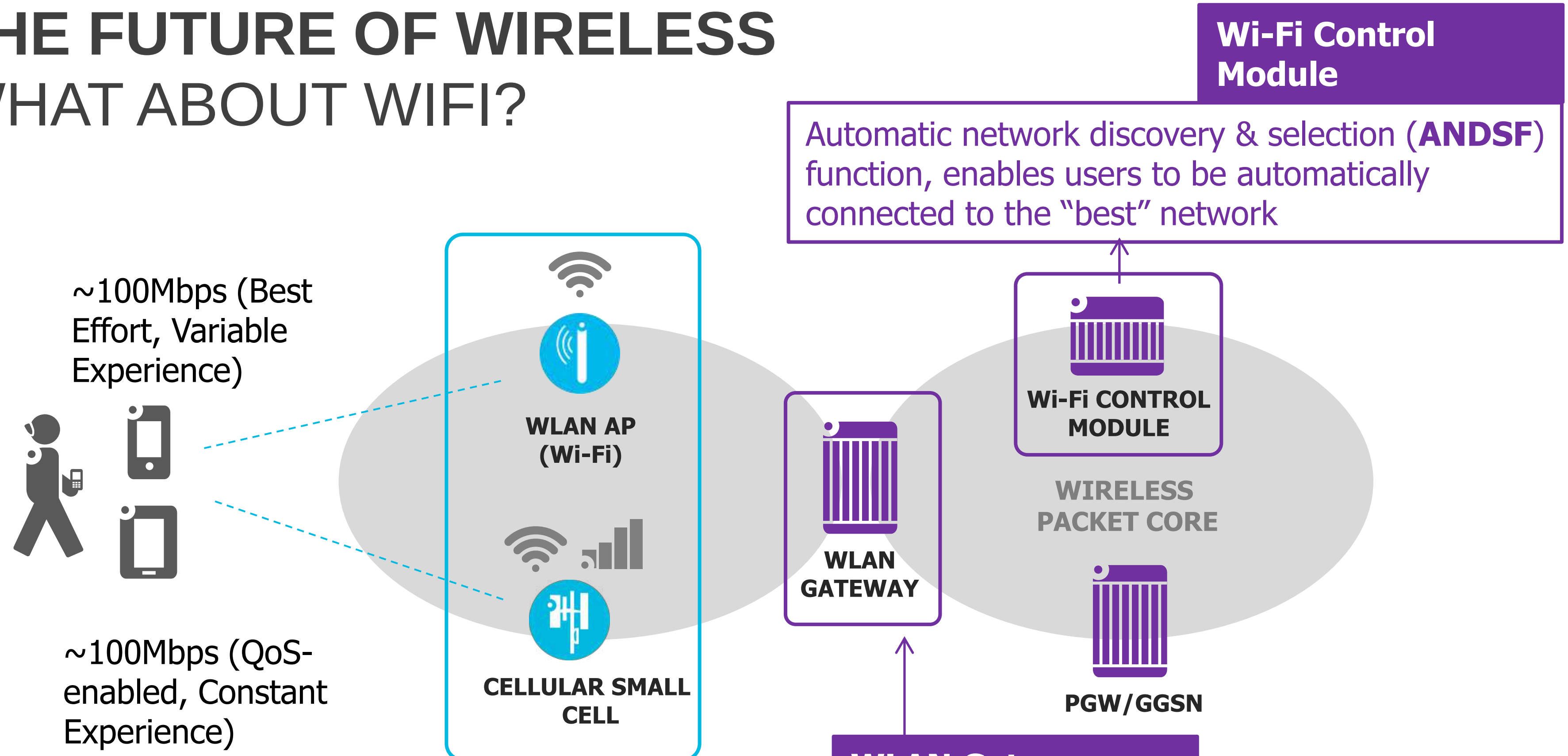
2017 Design
GPP-Centric but HW-Accelerated



- GPP: L3, L2 & some L1 Processing
- Integrated or discrete HW Accelerators: L1

SYSTEMATICALLY PUSHING TECHNOLOGY LIMITS

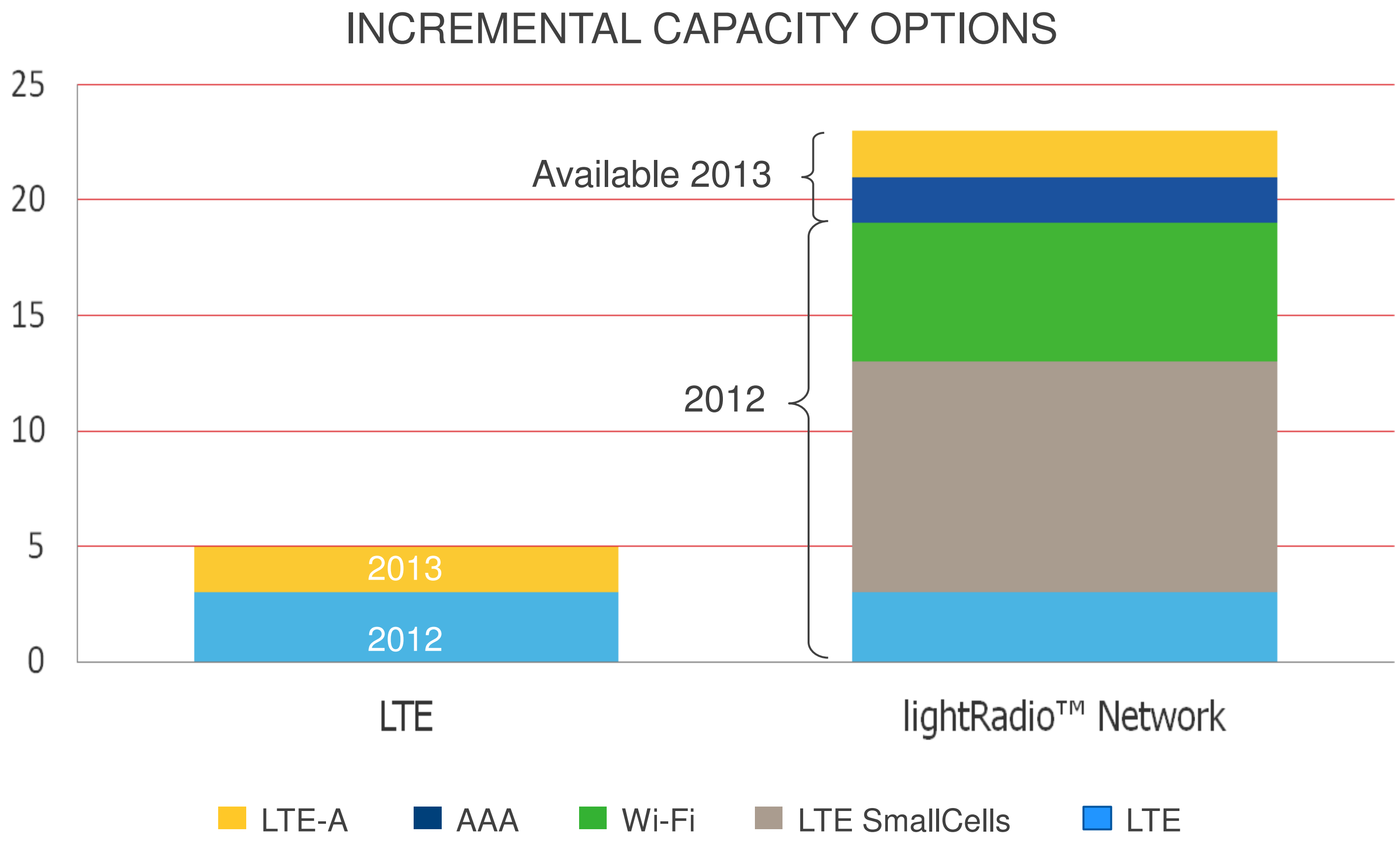
THE FUTURE OF WIRELESS
WHAT ABOUT WIFI?



Integrated Wifi+LTE Metrocells provide 'Anyspectrum' wireless access solution, with 'Anybackhaul' option

SEAMLESS ROAMING BETWEEN CELLULAR AND WIFI NETWORKS BASED ON BEST NETWORK FOR APP

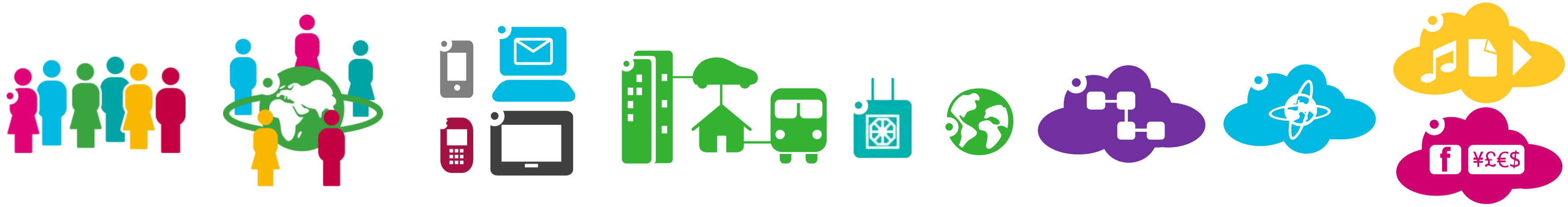
THE FUTURE OF WIRELESS
SMALL CELLS CLOSE THE “DEMAND GAP”



THE FUTURE IS TECHNICALLY REALIZABLE

IN SUMMARY

- **WHAT IS DRIVING THE MARKET?:** The Tablet Generation
- **WHERE IS THE REAL VALUE?:** Device + Cloud + Network
- **THE NEW REALITY:** The Network Platform (using SoCs, NPs, GPPs)



➔THE NEXT DIGITAL ECONOMY ENABLED

AT THE SPEED OF IDEAS™

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