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**Mobile World Congress 2017
The Hype versus the Reality**

March 2017

Preface

The 2017 edition of MWC - Mobile: The Next Element - reflected an industry at a cross roads and in search of its next growth engine. Many hope 5G and enterprise applications in vertical markets will energize the ecosystem. However, 5G remains the play of a few service providers in possession of millimeter-wave spectrum, and few vertical market applications cannot be served by LTE which will remain active for many years to come. In other words, the lack of growth is not attributed to technology but to outdated business process and culture that is neither agile nor flexible. Winning the enterprise segment requires mobile network operators develop new business models, and the necessary channels and support structure. To address this challenge, service providers need to revamp their operating processes and corporate culture to take advantage of technologies such as virtualization, IoT, edge computing, and artificial intelligence that dominated MWC. Nimble, aggressive and focused entities from inside or outside the industry have an opportunity to significantly impact the market.

The Xona Partners Team

From left to right: Riad Hartani, Richard Jeffares, Rolf Lumpe, and Frank Rayal. Not pictured: Anand Gupta.

Mobile World Congress 2017 Summary

Market ripe for M&A activities – US and India markets are prime, but not alone.

The convergence of IT and telecom is very evident with the increased penetration of computing systems in wireless networks in both the core and the edge.

Anything as a Service (XaaS) is quickly propagating as Capex spending slows. Silicon as a Service and Network as a Service are examples. The challenges include establishing a cooperative framework with clients, mitigating a competitive stance, and securing operating capital.

3.5 GHz spectrum owners & fiber ecosystem players – early winners of 5G hype cycle.

Focus on the enterprise requires vendors and service providers to revamp their go-to-market strategy and seek strategic partnerships: ecosystem development is key

Africa showed little presence at MWC17 – it holds tremendous growth potential!!

Automotive sector actively engaged in the mobile sector. This year marks another record in attendance by automotive ecosystem. However, we caution against irrational exuberance as V2X applications will be selective.

A Look Back at MWC 2007

- **Visitors:** 52,000 vs. 108,000 (2017)
- **Exhibitors:** 1,300 vs. 2,300 (2017)
- **Technology highlights:** First demos of LTE and 2x2 MIMO, and WiMAX
- **Best phone award:** Sony Ericsson K800 Cyber-Shot T (vs. Samsung Galaxy S7 Edge)
- **Best radio access product:** IP.Access 3G femto
- **Players no longer around:** Nortel, Alcatel-Lucent

In June 2007 – within 5 months of MWC '07 Apple launched the iPhone!

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V2X: Vehicle to anything

The Many Faces of 5G

Growing consensus that most applications targeted by 5G can be implemented with the LTE and its roadmap. We are cautious on its near-term commercial impact.

5G remains the preserve of a few MNOs in the US, Japan and Korea. Europe and the rest of the world remain on sidelines which is indicative of many underlying differences.

Verizon is in a unique position to leverage 28 GHz for cable broadband replacement. Still, we think laws of physics lead to high risk in achieving a competitive business case!
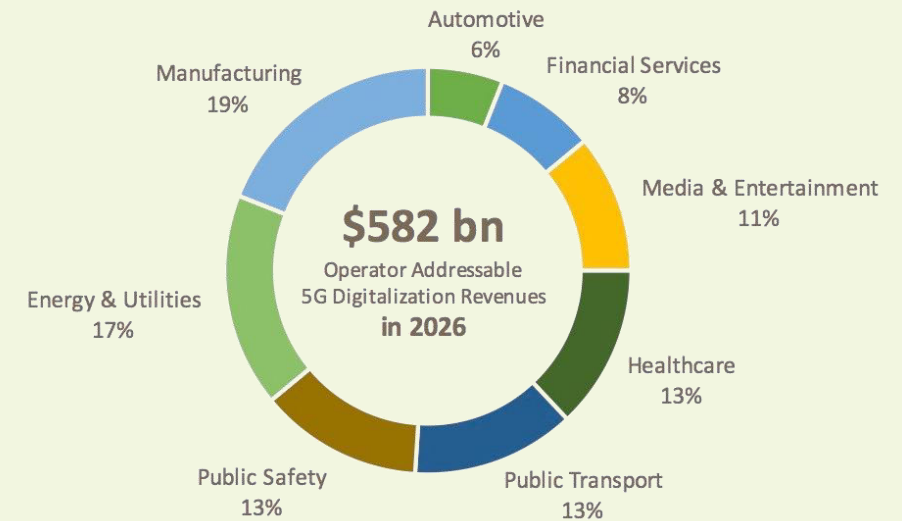
5G use cases are focused on enterprises in vertical markets where MNOs are traditionally weak: MNOs need to revamped business models to effectively capitalize 5G.

Few 5G applications cannot be delivered using today's LTE technology. The challenge is not in technology but in business models, culture and go-to-market strategy.

Ericsson unlikely to win points in being first to market with 5G NR – it needs vision and execution strategy. Nokia needs to execute on its strategy of enabling the enterprise. Huawei has a strategy and is executing. Samsung introduced first 5G CPE and is making a bold positioning move in infrastructure market winning 5 of the 11 Verizon trial markets.

One cannot think of 5G as a technology – it resembles a journey to a flexible network. Focus of MNOs will be on virtualization of the core – not on rolling out new RAN.

Peeling the layers of 5G: progress on deployment planning, tools and test equipment – the enablers of 5G – is evident.

$582 bn
Operator Addressable 5G Digitalization Revenues **in 2026**

- Automotive 6%
- Financial Services 8%
- Media & Entertainment 11%
- Healthcare 13%
- Public Transport 13%
- Public Safety 13%
- Energy & Utilities 17%
- Manufacturing 19%

NR: New Radio
RAN: Radio Access Network

LTE is King!

LTE and its derivatives will remain the major revenue driver for vendors as MNOs implement advanced features and emerging markets expand and roll out new networks

1 Gbps is closer to being enabled with silicon from Qualcomm and Intel, and infrastructure support from major vendors. It is great for a headline but few MNOs have the spectrum to enable it.

Massive MIMO, MU-MIMO, 3D-beamforming, high-order carrier aggregation, and 256 QAM were common demonstration – some will start rolling out in select urban areas – e.g. SoftBank in Tokyo and SKT in Korea.

The LTE roadmap will delay the need to roll out a new 5G air interface in the near future in sub 6 GHz spectrum. The ecosystem impact will be noticeable

Advanced LTE features will embolden some MNOs to claim 5G services which will confuse the market. This particularly will happen in markets where wideband 3.5 GHz is available which together with 4x4 MIMO will allow theoretic 1 Gbps speed.

The Massive MIMO option for 64-antennas is the favorite in the industry over other options.

Innovations in dynamic spectrum management and LTE/GSM coexistence will accelerate reframing of spectrum to LTE.

LAA, MuLTEfire, CBRS solutions closer to realization but market polarized as technologies pose challenge to MNOs and entrenched interests.

LTE will serve initially as backbone for 5G technology. MNOs favor migration to LTE for operational efficiency and performance

CBRS: Citizens Broadband Radio Services
LAA: License Assisted Access

Virtualization Ramping Up

Small, concrete steps towards implementation: Virtualization is a focus for MNOs in short and medium terms.

The convergence of IT and telecom is clearly evident with the increased penetration of computing systems in wireless networks in both the core and the edge.

Virtualization is key element in future networks: operators will focus more resources on enabling virtualization. Virtualization in the mainstream will definitely happen, but there will be a long period of transformation.

Network slicing promoted by the major vendors focuses on the core. The full benefits will require end-to-end implementation including RAN slicing which only a few players address.

Virtualized solutions are slowly making their way into carrier networks starting with functions such as vPCRF and vIMS. Although there are a few vEPC deployments, they remain limited to small markets.

Open source overload: many initiatives in telecoms are confusing the market at this early stage. Companies are resources stretched and uncertain on which initiative to back.

A clear change of attitude on RAN virtualization in the past year. The enterprise use case is prevalent. Shared (CBRS) and unlicensed spectrum is a catalyst to enable neutral hosts and new class of service providers. Disruptive outcome likely to follow.

VMWare vs. OpenStack battle will heat up as carriers look to break away from VMWare.
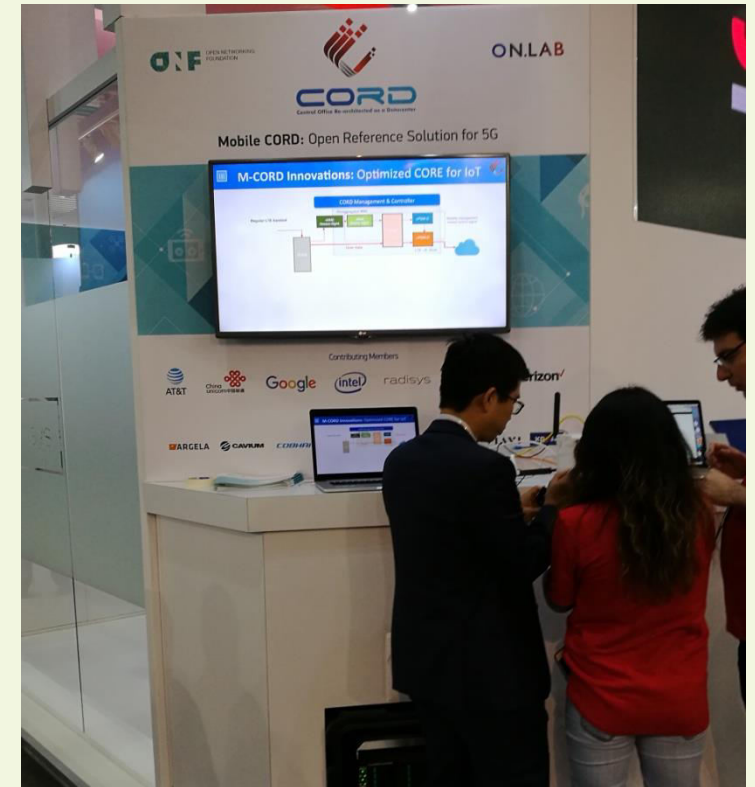
M-CORD, TIP examples of open source projects with participation by Google and Facebook.

M-CORD: Mobile Central Office Re-architected as Data Center
TIP: Telecom Infra Project

Artificial Intelligence Gathers Interest

AI garnering increased attention at different levels of the ecosystem: "predictive analytics" and "deep learning" amongst the buzz words.

Video analytics featured as key AI application, yet it does not require cellular connectivity to leverage it.

To truly benefit from AI, more expertise is required within many of the companies aiming at leveraging it.

Great disconnect between companies talking about AI and effectively implementing it – many lack the appropriate talent pools in house.

Many telcos copied a page from Softbank on the use of intelligent robots as a possible evolution of telco services. This is a drastic bet with increased competition ahead.

Incremental AI use cases will continue to develop as more data becomes available. We strong assert that the "AI + everything" story will not last: only the companies with strong AI teams will leverage its potential while most others will have to partner with specialized AI companies to achieve their goals.

The numerous applications of big data require active validation.
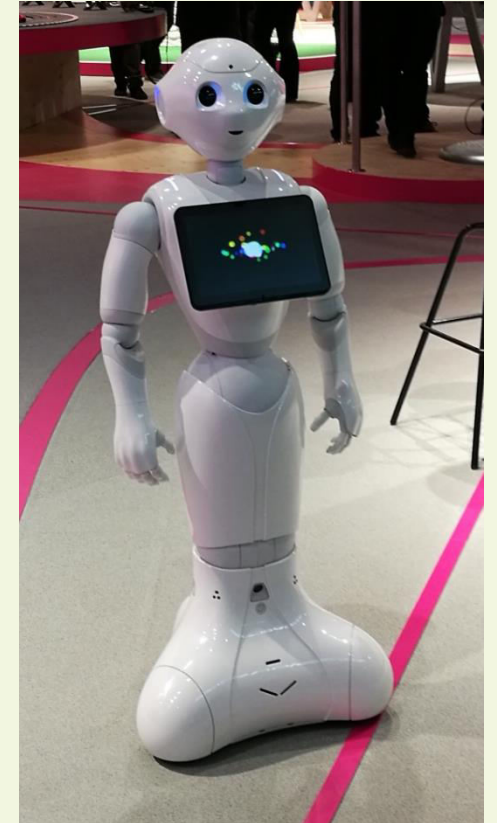
Interactive robots on display at many booths.

IoT: Rolling out

Cat-m1 and NB-IoT deployments to begin this year but the challenge remains on who the customer is!

MNOs favoring LTE Cat-m1 to take advantage of power efficiency over Cat-1, and data rate and voice capabilities over NB-IoT. The Cat-1 ecosystem will be squeezed.

Even with 22 pilots, interest in NB-IoT is down from last year as the hype wears off and MNOs complete their strategic planning ahead of deployments. Our warning last year on aggressive commercial have proved justified. Vodafone beginning commercial deployments this year in 4 countries along with China Telecom and M1 in Singapore.

The key challenge in IoT is monetization of the technology: multitude of applications and market fragmentation with specific local requirements complicate the sales cycle.

MNOs are challenged to prove the value proposition of their IoT services – facing significant in light of the possibility of private networks.

Wearables hype has dissipated as sector struggles to meet revenue forecasts and companies exist the market... Yet, many cellular IoT players pin hopes on this sector.

Roaming for IoT services to become a major topic in the year ahead.

Leading applications include water metering, alarms and security, container monitoring and pallet tracking.

Cellular IoT connections:
2016: 500 m → 2025: 5 bn [Source: Machina Research]

AT&T, China Mobile and others announced launch plans for IoT connectivity services.

# Cloud Players & MNO: The Jury is Still Out !

The Cloud players, led by Facebook, Google and progressively Amazon and Alibaba are gradually inserting themselves in the MNO value chain: Compete or complement? It remains to be seen!

Google is teaming up with MNOs such as Bharti, SKT and few others in an attempt to revive RCS. While seen as a way to provide MNOs a messaging alternative to OTTs, it's an attempt by Google to get its own messaging OTT. RCS, the living dead, will need more tricks to get back to life!

Although less headwinds related to the Facebook-led OCP and TIP initiatives, various MNOs see them as a way to improve control their vendor value chain to optimize infrastructure costs. The few remaining vendors are brushing it off. While unclear what effects one shall see out of this, they can be dramatic!

Well timed with MWC, Google announced the ongoing trials of SAS for CBRS 3.5 GHz, along with ecosystem partners. Enabling dynamic spectrum deployment model is at best, a curiosity for MNOs, and a threat for some.

Just as MNOs are starting to look at ways to leverage their data for advertising – an attempt many years in progress, with little success – various Internet players, such as Google, Amazon, Alibaba and Tencent are initiating MVNOs with data-driven monetization models to capitalize on new mobile service opportunities in the enterprise, IoT and 5G-like applications
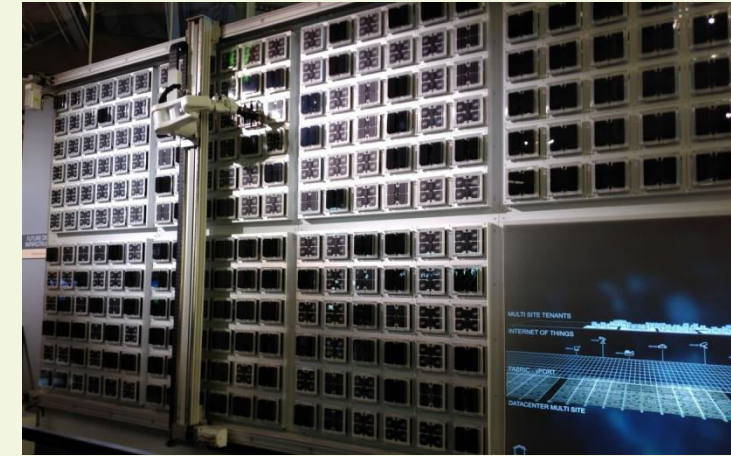
Cloud players key priorities
- Reduce the cost of Internet access infrastructure to increase subscribers and traffic on their networks
- Use open source models, open networks and dynamic spectrum access to reduce cost
- Positioning as potential partners with MNOs, but at the same time seen as competing with them

Success of these initiatives will be different depending on region. Regulators, mainly influenced by MNOs, will push back on any rapid and significant change

OCP: Open Compute Project
RCS: Rich Communication Services
SAS: Spectrum Access System

Spectrum: New bands, new rules!

5G spectrum definition, dynamic spectrum access, and new bands for backhaul are key subjects.

3.5 GHz positioned as 5G global roaming band; driven by interest in China and Europe. Qualcomm, ZTE, Huawei, China Mobile active on solution development and interoperability testing.

28 GHz band emerged in the lead for 5G fixed wireless access, outpacing focus on other bands - use of E-band in 5G access disappeared this year.

We anticipate interest in 4 GHz for 5G access to increase. Military and satellite users will put strong resistance.

Dynamic spectrum access not as much on display, but remains a key topic for regulators and research centers. MNOs will continue to resist. US carriers seen more amenable to 3.5 GHz CBRS than in past years.

60 GHz point-to-multipoint systems are making their way to market leveraging 802.11ad WiGig and targeting mesh applications in data and mobile backhaul. Europe lags in defining appropriate rules in this band.

LTE/GSM coexistence will accelerate reframing of spectrum to LTE and VoLTE deployments in the future.

FDD/TDD convergence well underway with over 10 markets in play.
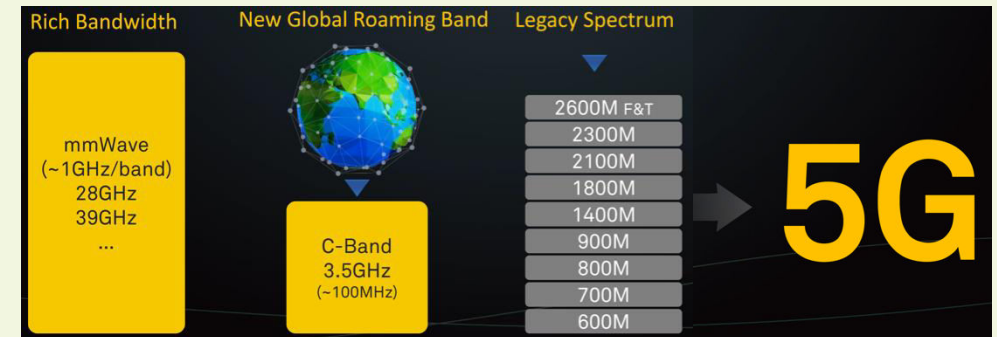
Absence of 5G spectrum is problematic if we think of 5G in traditional way: a new radio technology. However, 5G can be very different!

Startups @4YFN: Harvesting Quality out of Quantity

Startups still burgeoning, thanks to the "anything-Cloud era" for lowering launch costs. Fundamentals still the same in 2017: Starting a new venture = simple; Real product offering/differentiation with "legs" and scaling = hard.

Hundreds of startups on premise; dozens of countries represented; thousands of attendees and hundreds of venture/angel capitalists: filtering potential winners from the rest is a daunting task. We believe the classic startup pitching model needs a radical shift.

There are very few technology-differentiated startups; the focus is on market segments and business differentiation. This makes scaling, the main challenge to tackle along with the required funding support.

The presence of the different countries in force, highlights the strategic importance of developing technology startup ecosystems as a foundation for social development. But, heavy reliance on public funding is challenging as it is on the verge of becoming counterproductive, favoring quantity vs. quality.

Fintech, Health IT, Agro IT and "any" tech is in fashion. Bringing technology into mainstream industries will mature slowly, and requires different funding, innovation and M&A models. The existing incubation / acceleration models needing a region/industry specific adaptations.

Looking for smart funding in an ocean of startups
- Except for few tech ecosystems (Silicon Valley and few fast followers), funding models are not yet ready to support Internet-scale focused startups.
- Angel investment models face challenges on both ends: the rise of crowdfunding and the inflation of incubators/accelerators. Urgent need to adapt!
- Venture capital firms are caught in the valuation game: keep funding or lose dilemma. Urgent need to adapt the model!

The tech industry is driven mainly by the Internet and Cloud players. Players in different industry verticals have a challenge in integrating new technologies (Cloud, AI, data, etc.) with not so new ones (transport, energy, etc.). In less regulated markets (e.g. Fintech in China) startups have a better chance to scale and compete against the industry giants.

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Focus on Applications

Applications massively on display instead of pure technology. Low latency is primary consideration surpassing the necessity for throughput. Robotics, drones, virtual and augmented reality, and connected vehicles were featured.

Industrial robotics: Network slicing.

Drones: Hetnets in the air.

Virtual Reality: Edge computing.

Connected vehicles: LTE-M connectivity.

Marine life: IoT, AI.

Gaming: Hetnets and edge computing.

Some applications indicative of an industry that's ahead of itself with unrealistic claims.

Perhaps exemplary is Ericsson's CTO Ulf Ewaldsson's honest assessment that for a certain connected car application, 5G network would require enormous investment.

From an even more practical perspective, Wi-Fi service at the venue remains very poor. On the bright side, LTE worked reasonably well!

Meet Us Next at These Events

Xona Partners will be in Hannover on March 20-24th at **CeBIT 2017**

Join us at
Industrie 4.0, IoT and AI: Legal and Social Challenges
German-Japanese Value Partnership
Tuesday, March 21 at 10.00 – 14.00 | Convention Center, Hall 3

Additional information at: http://www.cebit.de/en/

Xona Partners will be in London on March 28-29th at **TMT M&A 2017 Forum**

Additional information at: http://www.tmtfinance.com/merger/

To book a meeting, please contact us at: advisors@xonapartners.com

About Xona Partners

Boutique Advisory Firm Specialized in Developing New Technology Ventures & Growth Strategies

Private Equity & Venture Funds

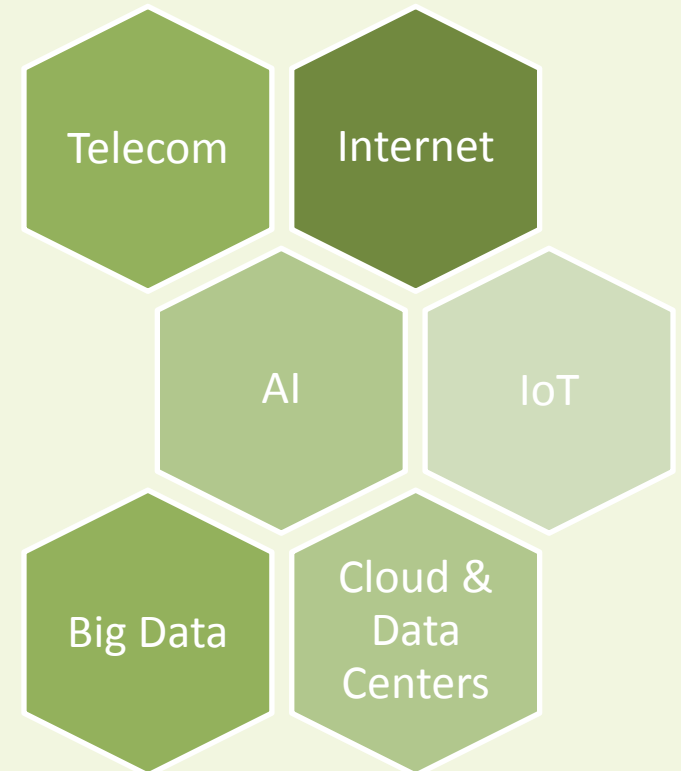- M&A due diligence; competitive analysis & market positioning

Technology Corporations

- Develop new business ventures from concept validation to implementation

Governments, Regulatory & Policy Makers

- Market & technology assessment for policy decisions

Telecom

Internet

AI

IoT

Big Data

Cloud & Data Centers

On the Lighter Side

To all our clients, business partners, friends and colleagues, it was pleasure meeting you in Barcelona!

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Innovate. Enable.