

Digital transformation and challenges in 5G network

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Abstract- 5G business models meet a growing market demand for ultra- broadband-enabled data applications within vertical market segments including Finance, Tourism, Public transportation, Energy and Defense. Cybersecurity is a critical issue. Keywords Business modelling – Vertical markets - Internet of Things – Smart cities – Cyber security.

Introduction

The telecommunications industry is playing a crucial role in enabling this digital transformation that is affecting all vertical markets (Finance, Automotive, Public Sector, Healthcare ...).

The increasing availability of technological platforms in a perspective of convergence between Mobile, Artificial Intelligence, Cloud, Big Data / Analytics is dramatically changing the way we live, work, and interact. This trend is part of the Fourth Industrial Revolution, called "Industry 4.0".

Telecom operators' share of the industry profits show a constant decrease in revenues, despite their fundamental role in enabling digital transformation in all industries and public sector

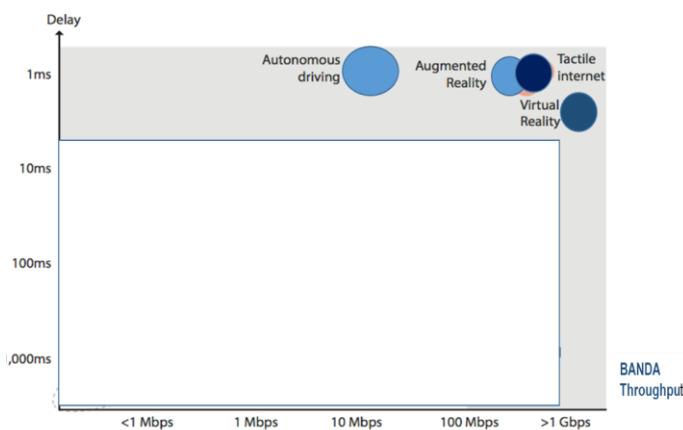
The rapid evolution of telecommunications infrastructures and services sees the Telecom industry operators affecting the 45% of overall TELCO industry profits pool in 2018, a constant

decrease every year from 58% in 2010. according WEF analysis. The new investment and business opportunity scenarios for ICT enterprise, professionals and engineers are linked to the development of LTE and 5G technologies in the mobile and in the fiber infrastructure and Cloud with the emergence of Software Defined Network architectures in networks whose security and resilience are at the centre of the investments . The new business models respond to the growing market demand for "ultra-broadband-enabled mobile data applications" which are central to the vertical markets of Industry Finance, Tourism, Public Sector, Automotive, Energy, PA-Defence. Industry 4.0 is at the centre of the "digital Transformation" of Telecommunications and benefits from the new 5G network architectures envisaged in the 5G operators development programs The telecommunications industry has provided all the building blocks of the infrastructures: fixed and mobile broadband access network, core infrastructure, interconnection and cloud application platforms. The whole process of digital transformation will depend on the Telecommunication Industry which is enabling changes also in the organization of work as in the case of smart working. Operators tend to differentiate themselves both in business models and in the services offered to Business and Consumer customers.

However, despite the role played by the Telecommunication Industry is fundamental in the acceleration of the digital transformation in business processes, we do not find a similar advantage with a significant confirmation in the increase in value for the Telco operators that have contributed to this development. This despite new investments in networks and infrastructure innovation. The closer the performances of the Telco operators are, thanks to better performing networks, the more difficult it is to stand out, thus leading the industry to search for new business models and meet customer needs through innovation.

An explosion of services, however, that does not generate an equally significant growth in benefits for telecommunications operators caused by the migration of revenues from Telco operators to Over the Top. We are thus witnessing rapidly changing business models, a paradigm leap in technology with IP and SDN infrastructures, and the convergence of Cloud, Mobile, Social and Big Data platforms. Everything is changing in the telecommunications industry with unprecedented acceleration that is taking shape with 5G.-

5G business models meet a growing market demand for ultra- broadband-enabled data applications within vertical market segments including Finance, Tourism, Public transportation, Energy and Defence. Furthermore, enterprise mobile applications will receive benefit from lower latency and improved spectrum efficiency (i.e. Software Defined Radio and Cognitive Radio in a increasing overall network capacity). Delay and latency are fundamental to developing new services in 5G market:



5G is not only an evolution of the current 4G - LTE but it is presented as a paradigm leap that will lead to the opening of new scenarios and to the development of services and business models in vertical markets.

The new 5G mobile network will increase connection speeds by integrating more access modes, far superior to 4G, and will guarantee very low latency times, and in consideration of high performance will enable the connection of wireless devices and sensors in the architecture IOT. The 5G network is designed for the new cyber security scenarios by offering resilience and mitigating attempts to violate the mobile telecommunications infrastructure. With these characteristics, 5G will lead to the creation of services that will change the way people live, produce, work and move.

For these reasons, the advent of 5G is an integral part of the Fourth Industrial Revolution , Smart cities and smart working .

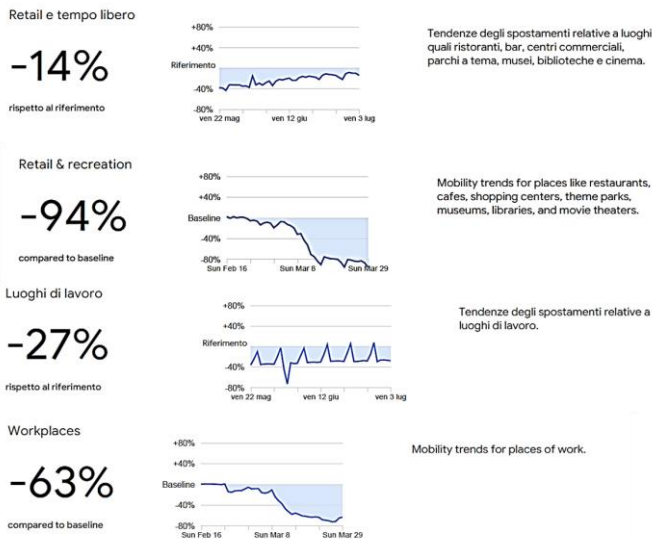
A series of articles are available on line in the framework of the technical magazine IoRoma, published by the Order of Engineers in Rome:

TELECOMMUNICATIONS INDUSTRY: How telecommunications enable the fourth industrial revolution

<https://rivista.ording.roma.it/industry-4-0-come-la-digital-transformation-incide-nella-rivoluzione-industriale/>

In the mobility area we envisage a new scenario with 5G: public transportation will improve and mobile applications for local authorities and citizens will be ultra-broadband (ref. in following pages: urban mobility project and related trials).

During COVID previous period mobility changes and smart working were key to enable an entirely new scenario.



The techno economic analysis of LTE and 5G evolution is mandatory for a 3G-like success story across Europe. The economic figures for these kinds of services are quite positive under specific circumstances. Tools and methodologies for market and business case modelling will be presented, in order to be aware about this research area.

A fundamental issue is to think long-term scenarios and to provide true market projections for the 5G next generation wave. To this purpose, specific tools and business models with a particular stress on the economics and revenues drivers have been developed in the best practice. The use of simulators will facilitate the understanding of the initial situation and its

possible evolutions, as well the identification of the future economical potentialities.

The purpose of this market model is to construct a system that can provide with preliminary market forecasts for a range of major telecommunication businesses. The model is able to provide market forecasts for a range of wireless telecommunication businesses including 5G, existing wireless as well as new opportunities to form part of the overall business plan. The business model tool provides good results based on the input information. However, high quality and reliable results will require intervention from a skilled analyst to input and interpret other factors such as likely competitive environment - therefore the user will need to be highly skilled in understanding telecommunications markets.

Today big players in 5G emerging market are defining strategic priorities and business models

“A careful examination of potential 5G scenarios, use cases and business models is urgently needed along with a realistic assessment of the complications that may just have LTE’s market development due to revenue stream overlapping.”

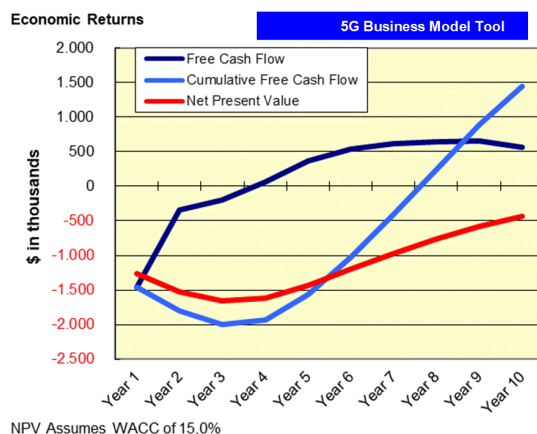
There is indeed a need for preliminary analysis on potential 5G use cases, and forecasts are not based on linear mobile evolution. In 5G scenarios, we envisage a market disruption and a



We need to reinvent 5G business model in a Cloud Centric Network Sharing Platform, furthermore we need to imagine the role of the Wireless Service Provider of the Future.

Key words are ICT Cloud centric network sharing platforms and Internet of Things

Use cases need to be described in vertical markets: Smart cities and urban mobility / connected cars. We envisage a new market push in 5G due to Telco infrastructure enhancements to broaden the opportunity for IoT and M2M applications.



Maintaining the promise- 5 G and new market development

According to consultants view, 5G will support the rising demand for wireless networks of the mass market in the fields of bandwidth demanding applications such as:

Entertainment

Multimedia

Intelligent Transport Systems (ITS)

Telemedicine

Emergency and safety/security applications

But also futuristic developments like:

Tactile Internet

Virtual and augmented reality that combines data

ICT trends

Major consultants predicts ICT industry digital transformation in all key industries due to strong interaction of all major platforms : Big Data, Social , Mobile and Cloud :

The digital transformation in vertical markets and public sector shows that these interdependent trends are "transforming the way people and businesses relate to technology"

The evolution towards the smart factory and Public Administration 4.0: digital transformation and new job and professions.

The Industry 4.0 transformation process must however be placed as a piece of the more general process of technological change that will affect, sector by sector, all segments of the economy: from Public Administration to energy industry, from tourism to pharmaceuticals. A process of transformation that will be characterized by an important process of technological deflation, inevitably connected to the progressive dematerialisation of production processes and products. Business models are key to understand future market developments.



he impact of the smart factory will bring organizational changes and therefore to labor contracts and industrial relations. In a scenario characterized, thanks to the domination of technology, by greater collaboration and the presence of high professionalism, rather than the mere elaboration of orders and directives, a work

paradigm emerges in which the very dimension of the contract and the dependency relationship between worker and company is revolutionized.



5G : he big picture

5G will provide intelligent access in IOT and broadband wireless connections. Big Data and mobile will be key in enterprise market development . Social media and IOT platforms will be a disruptive wave ..

New social analytics and mobile tools will be key in the digital transformation scenario. The new ways of communicating, of people and companies, and the explosion of applications made available intuitively through the app store model, cause not only a continuous growth of data traffic, but also variations in the mix of types of traffic and more stringent end-to-end quality requirements.

An in-depth analysis is available in the journal IoRoma

<https://rivista.ording.roma.it/digital-transformation-2/>

In urban mobility, we understand that mobile device interactions are passive as users accept information from social media and mobile apps, delivered from intelligent systems in cloud architecture. Next generation communication

systems are expected to be intelligent in nature, as well as providing a platform for operators to effectively exploit their network resources in an era where spectral resources are at a premium.

The smart cities can be designed based on cognitive radio which is meant for spectrum sensing and spatial sensing. It also uses the massive MIMO and the heterogeneous network which uses small cells called Femto / Pico cell.

The Digital Transformation and the 5G are two sides of the same coin and enable the new revolution of Industry 4.0 as examined in the article taken from the event on Industry 4.0 that is available on the journal IoRoma

Cyber security challenges in a post-pandemic world

Accessing corporate resources remotely through virtual private networks (VPN) has traditionally led to a more secure access policy; the need to introduce remote work has resulted in more permissive VPN access policies, which is creating security risks that provide severe threat to corporate networks.

We need to improve security based on passwords and move to multi-factor authentication. We can take this COVID threat as an opportunity to improve our security policy and delete old practices, such as passwords without security strong authentication rules, We have the opportunity to move on to more secure technologies.

REFERENCES & BIBLIOGRAPHY

Digital Transformation

<https://rivista.ording.roma.it/industry-4-0-come-la-digital-transformation-incide-nella-rivoluzione-industriale/>

<http://rivista.ording.roma.it/digital-transformation-2/>

<https://rivista.ording.roma.it/industry-4-0-come-la-digital-transformation-incide-nella-rivoluzione-industriale/>

5G & COVID

- <http://www.anutei.it/index.php/8-conferenze/39-5g-e-salute-facciamo-chiarezza>
- <http://www.iothingsmag.com/5g-e-sicurezza/>

INDUSTRY 4.0 ,Smart Working & 5G

- [5G e Industria 4.0, il ruolo delle telco per la quarta rivoluzione industriale](#)
- [5G cosa cambia per il mondo del lavoro](#)
<https://www.agendadigitale.eu/infrastrutture/5g-cosa-cambia-per-il-mondo-del-lavoro/>

5G & CYBERSECURITY

- [Cybersecurity a prova di 5G, così nasce la "resilience by design"](#)
- [Cybersecurity per IoT e 5G, il ruolo strategico degli standard](#)