Public Consultation
on draft BEREC Work Programme 2017
-
Position paper of EOLO Spa

EOLO SpA – Via Gran San Bernardo, 12 – 21052 Busto Arsizio (VA) Italy
PI: 02487230126 - R.E.A. 339475 - Reg. Imprese VA - 02487230126 - Capitale sociale € 5.000.000 i.v. - Socio Unico Cometa S.p.A.
Tel: 02.3700851 – Fax: 02.37008570 – eolo.it

Index

EOLO

EOLO (former NGI) was established in 1999 to provide hosting and connectivity to the Italian on-line gamers. In 2007, NGI started to deploy the EOLO network, **one of the most extended fixed wireless networks in the world** (fully independent from the Italian incumbent "Telecom Italia"). In 2016, NGI becomes **EOLO SpA** and, nowadays, EOLO's network counts **220k customers** placed in **13** Central and Northern **Italian Regions**.

Figure 1: Coverage of the EOLO network - Q4/2016

EOLO core market is focused in **sub-urban and rural areas**, where **FWA networks had an important role in reducing** the first step of **digital divide** (2 Mbps) and is having a similar one also in the second step[1] (30 Mbps).

The speed and quality of service supplied by EOLO **are strictly comparable** to those typical of an **ultra-broadband access**. Furthermore, **our technology allows to supply connectivity services through radio spectrum**, without requiring deployment of ducts and cables for the so called "last mile" segment. This feature assures **highly reduced time and cost of deployment compared to wired networks**.

Today EOLO provides service from 30 Mbps (for consumer customers) to 1 Gbps (for business customers).

	EOLO Top	EOLO30 Plus
	Symmetrical Point-to-Point Connection	**Residential Ultra-Broadband**
Download	from 25 Mb/s to 1 Gb/s	up to 30 Mb/s
Upload	from 25 Mb/s to 1 Gb/s	up to 3 Mb/s
Band Guarantee	99%	128/128 Kb/s
VoIP	n/a	Free
IP address	Static	Dynamic (Static upon request)
Installation	Custom-designed	Free
Post-sale support	Custom-designed	Standard
Monthly fee (VAT excluded)	starting from 1.050,00 €	36,80 €

[1] See http://www.governo.it/sites/governo.it/files/strategia_banda_ultralarga.pdf, page 96.

INTRODUCTION

EOLO welcomes the BEREC's efforts in development of regulatory best practices amongst National Regulatory Authorities (hereinafter NRAs), leading to independent, consistent, high-quality regulation of electronic communications markets, thereby contributing to the further development of the internal market for the ultimate benefit of Europe and Europe's citizens.

It is primary aim of EOLO to underline the strong importance of **Fixed Wireless Access (FWA) technology in the achievement of Digital Agenda for Europe 2020 objectives**, especially in rural and sub-urban areas. In this sense, the Italian Broadband Strategy already appreciated the strategic role of the FWA in the achievement of the first and second target of the DAE 2020 and considered a related role for the third step too: "*a strategic role for marginal areas and rural areas can be played by fixed wireless access services, that in Italy has already achieved important results in large areas of the territory*"[2]. The same for the Italian NRA for Communications (AGCom), that in its last quarterly report highlighted the importance of the FWA, connected to the rising share of medium/small operators in the fixed access market and to the development of the entire Italian fixed market: "*The growth of other operators' market share (+1.2 pp YoY) is firstly due to the dynamics of the number of FWA lines*"[3].

Secondly, according to EOLO, the regulatory framework review should not take in account just only the mobile (broadband) services but also the Fixed Wireless Access services, which use the **frequency bands as substitution for the last mile wired infrastructure**. A proper availability of the spectrum is therefore crucial for the development of fixed wireless access Industry, which is especially interested in band packages useful to maximize quality and speed of the service. Furthermore, also the assignment procedures and conditions appear to be a decisive factor to promote the investment and minimize the time of return.

Considering the necessity to pursue and realize the three strategic pillars for BEREC's activities[4], EOLO would like to underline the positive contribution of the Fixed Wireless Access technologies to the Union targets.

[2] The Italian strategy for Next Generation Access Network - The Presidency of the Council of Ministers (3/2015).
[3] Communication markets monitoring system 3/2016 – Italian NRA for Communications (10/2016).
[4] "(A) promoting competition and investment, (B) promoting the internal market, and (C) empowering and protecting end-users" – BEREC Work programme 2017.

1. DIGITAL AGENDA FOR EUROPE 2020

In 2010, the Commission called[5] for the adoption of the Digital Agenda for Europe. Taking in account a group of undesirable evidences differently observed through the Union (like as fragmented digital markets, lack of investment in networks and digital skills), the Agenda has been adopted to deliver sustainable economic and social benefits from a digital single market based on fast and ultrafast internet and interoperable applications.

Among others, the Agenda fixed **a common target of internet connection availability** to whole of the citizens. In detail, ensuring by 2020 (i) all Europeans must have access to internet speeds above 30 Mbps and (ii) 50% or more of European households must subscribe internet connections above 100 Mbps.
Nowadays, the Commission is constantly evaluating output of different actions that each country is realizing to reach the connectivity objectives. Indeed, within **Digital Single Market Strategy**[6], the Commission measures progress of the European digital economy through implementation of a Digital Scoreboard[7] and update of a proper Digital Economy and Society Index (DESI).

The below charts are part of evaluation of the connectivity indicator[8] within DESI and show European fast broadband (at least 30Mbps) households penetration between 2010 and 2015 and, for each country, the penetration in 2015.

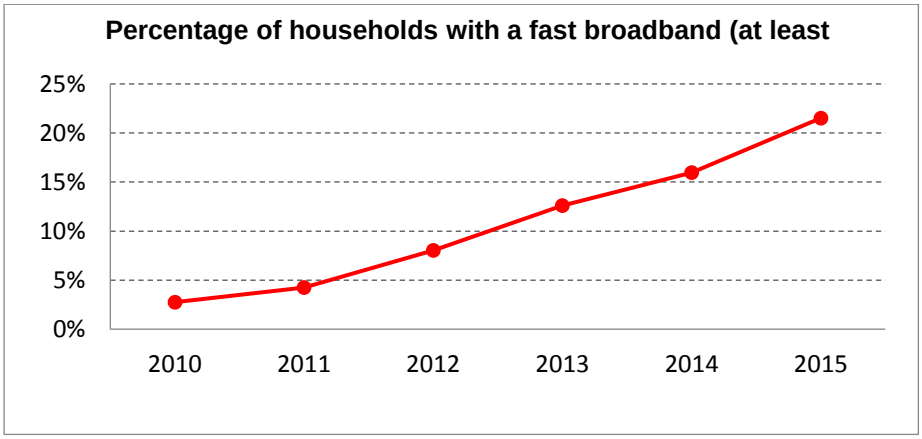

Figure 2

[5] Communication from the Commission to the European Parliament, the Council, the Social Committee and the Committee of the Regions, COM (2010) 245 final A Digital Agenda for Europe.
[6] The Digital Single Market strategy, adopted on the 6 May 2015, includes 16 initiatives to be delivered by the end of 2016. The initiatives are based on three pillars: Access (better access for consumers and businesses to digital goods and services), Environment (creating the right conditions and for digital networks and innovative services), Economy & Society (maximising the growth potential of the digital economy).
[7] https://ec.europa.eu/digital-single-market/en/digital-scoreboard.
[8] Europe's Digital Progress Report 2016 – Connectivity, https://ec.europa.eu/digital-single-market/en/download-scoreboard-reports

A little bit more than **a fifth of European homes subscribed a fast-broadband access of at least 30 Mbps** in 2015 (22%), with a significant increasing since 2010.

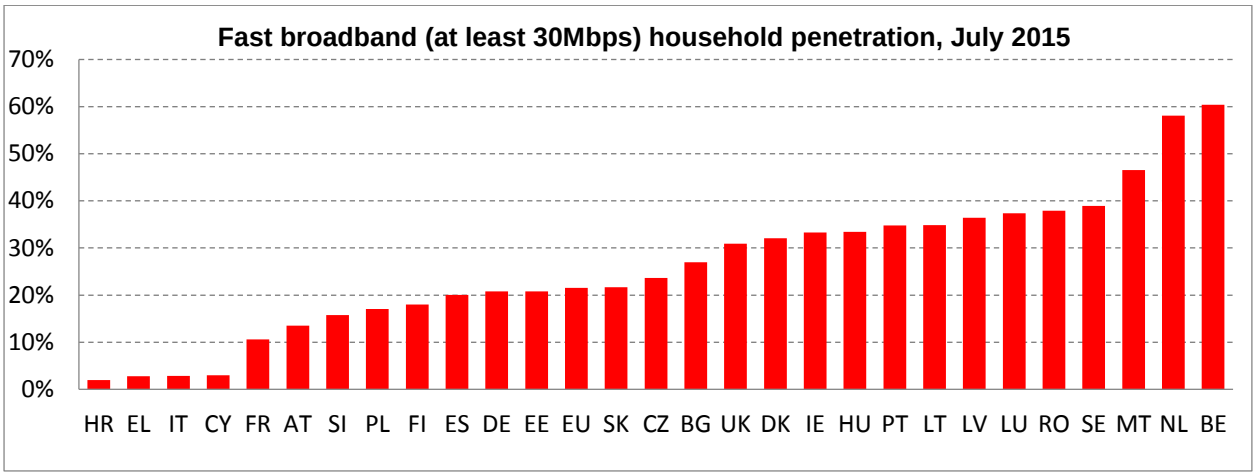

Figure 3

In Belgium and the Netherlands more than half of homes already subscribes fast broadband, while in Croatia, Greece, Italy and Cyprus, high-speed services remain marginal.

The output of these charts confirms that **a large part of Europe appears still far away from achievement of the Digital Agenda for Europe targets** in terms of connectivity.

For these reasons, the objective to bring UBB services to the households still remain a target to be achieved as important as to provide ubiquity connectivity. In this prospective FWA technologies still have to play an important role to target this goal: mobile networks are not able to guarantee the bandwidth for each user (the band is delivered following probabilistic patterns), instead FWA networks provide services **up to 1 Gbps to business customers**, with point-to-point equipment (P-P), and **up to 30 Mbps to households**, with point-to- multipoint equipment (P-MP). Moreover, current R&D roadmaps foresee an upgrade of **FWA offer to households**, with services up to 50 Mbps by the end of 2016 and up to **100 Mbps by the end of 2018**.

2. FACILITATING MOBILE AND FIXED CONNECTIVITY IN "CHALLENGE AREAS"

Considering recent market trends, including developments of NGA networks and the encouragement of investment in high-speed broadband infrastructure, EOLO would suggest to the BEREC to consider the **role of the Fixed Wireless Access technologies to the Union targets,** especially **in** that so called "**challenge areas**".

2.1 CHALLENGES AND DRIVERS OF NGA ROLLOUT AND INFRASTRUCTURE COMPETITION

The need of the FWA networks to ensure a direct visibility between the BTS and the small antenna placed in the customer (residential or business) premises allows this technology to be especially appropriate for sub-urban and rural areas. Here, the lack of buildings concentration cannot interfere with this point to multi-point (point to point for business users) last mile data transmission. The above-mentioned feature and the different deployment costs outline the **complementarity between fixed wireless, mobile and optical fiber networks**.

In accordance to its 2015-2017 strategy, the BEREC should consider this complementarity to guarantee a correct **infrastructures' mix to ensure a favorable environment for the investment** (so that to promote the access to high-performance broadband services to the 100% of the European citizens by 2020). Including and especially for those users placed in the so-called "challenge areas".

De facto, the distribution of the population and the orography of the Italian territory have recently supported the development of the FWA and highlighted as this technology could represent an example of **infrastructure-based competition**, not yet been performed even in a context of "*continued access investment by competing operators*"[9].

[9] BEREC Strategy 2015-2017.

2.2 FWA TECHNOLOGIES CAN ENSURE ULTRABROADBAND CONNECTIVITY

The European Commission stated in its **2013** Guidelines for deployment of broadband networks that "*at the current stage of market and technological development, **NGA networks are**: (i) fiber-based access networks (FTTx); (ii) advanced upgraded cable networks; and (iii) certain **advanced wireless access networks** capable of delivering reliable high speeds per subscriber*". Furthermore, such orientation is also confirmed in the "Digital Agenda Scoreboard", where NGA networks, beyond traditional optical fiber ones, comprises "*technologies other than FTTH, FTTB, VDSL and Cable NGA, which are capable of at least 30 Mbps download*".

More in depth, considering that FWA protocols, differently from those used for mobile communications, are not required to constantly manage handover and interoperability, and that the related connectivity service is provided

(i) ensuring **Line of Sight** (LoS) between transmission site (BTS) and customer location
(ii) equipping user site with a small **antenna**
(iii) just only to a **fixed location**

It is clear that FWA performances are strictly comparable (and better) to those typical of LTE-5G. The chart below describes a **wide range of technologies able to provide innovative and ultrabroadband services** in a fixed location, FWA included.

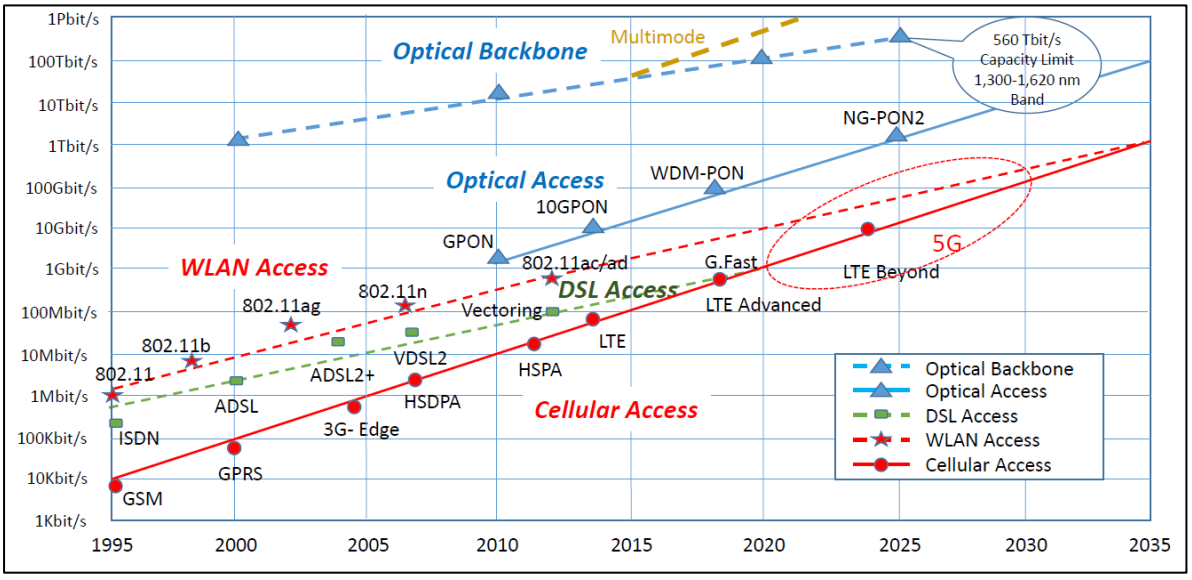

Figure 4: Source of Prof. M. Dècina (2014), based on data by Bell Labs, G. Fettweis, and others

The following figure shows as currently available Point-Multipoint (P-MP) **FWA applications have a spectrum efficiency of 30 bps/Hz**, thanks to implementation of Massive User – Multiple Input Multiple Output (Massive MIMO 14x14) paradigm.

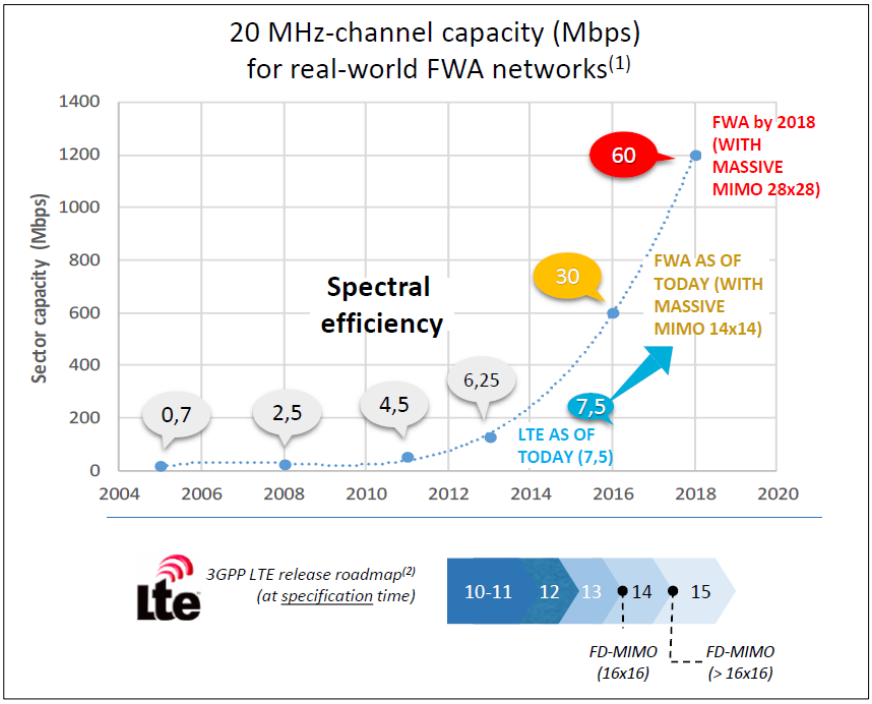

Figure 5: Source of Cambium Networks (1) and Qualcomm (2)

For these reasons, **FWA can be an efficient and crucial solution to ensure the availability of UBB services in extra-urban/rural areas** and to achieve the DAE targets mentioned above.

The mobile technologies are not built to bring UBB services but to ensure connection in mobility. Furthermore, the development of technology will provide band to mobile networks but does not will replace the fixed line, especially for those applications that require very high bandwidth and low latency (for example, real time applications).

In conclusion, FWA can be the alternative of wired line especially in the most "challenging areas", whereas the mobile network can be complementary (and not a substitute) to the fixed network (wired and/or wireless) and ensure the ubiquity of access.

3. SPECTRUM NEEDS TO FOSTER INNOVATION IN EUROPE

The European spectrum strategy for introduction of 5G is expected to drive the Union towards **a new generation of wireless paradigm**, able to provide a wide range of **innovative services** (i.e. IoT, M2M, etc.) and **universal access to ultrabroadband** connectivity for each European citizen.

In this context is important to highlight that the so-called **5G** can not simply be considered as the upgrade of the mobile networks (LTE 4G), but **must be evaluated as a new paradigm of wireless networks, whether fixed and/or mobile**. EOLO would like to underline contribution that Fixed Wireless Access (FWA) could provide to achieve both the objectives (i.e. innovative services and UBB connectivity). For example, the development of IoT services in rural or sub-urban areas (where, however, are located factories) goes through the FWA networks that, already, are able to ensure the UBB services in these areas.

In this context, it is very important that **development of** Europe's spectrum policy strategy regarding **mobile service would not hinder the development of FWA networks.**

3.1 ENHANCING FWA POTENTIALITY

Nowadays, the largest part of FWA operators provides their connectivity services through **unlicensed 5GHz spectrum** and through **licensed 24.5 – 26.5 GHz and 27.5 – 29.5 GHz**, also known as Wireless Local Loop (WLL) band. For WLL, the Italian Ministry for Economic Development (MiSE) is currently performing a second stage[10] of the allocation procedure started in 2002.

Moreover, at the end of 2015 AGCom issued[11] the **guidelines for allocation and usage of 3.6-3.8 GHz** band, introducing an innovative mechanism of geographical shared access to the spectrum. In depth, the NRA identified two types of cluster ("town" and "territory") to manage through two different frameworks.

This choice appears more reasonable taking in account what the Authority stated, in the mentioned guidelines, referring to the contribution of Fixed Wireless Access and usage of **3.6-3.8 GHz frequencies, particularly suitable to provide fixed radio access in rural areas** (or cluster "territory")[12].

Consequently, the conclusion of the still ongoing allocation procedures of this band (in charge of MiSE) is expected to partially solve the European Commission concerns about a "*lack of sufficient investment*

[10] http://www.fub.it/gara_wll/gara_wll.php#stato.
[11] Del. 659/15/CONS available at http://www.agcom.it/documents/10179/3485599/Delibera+659-15-CONS/b6dc88ed-4cc8-43b7-bbec-e55ed1f8dad9?version=1.0
[12] Del. AGCom 659/15/CONS, Par. 73.

notably in rural areas, problems which will not be fully resolved in the context of the ongoing discussions on the Telecoms Single Market package"[13].
Generally speaking, it is clear that performances of Fixed Wireless Access are mostly determined by spectrum availability and efficiency. Currently situation highlights that unlicensed **spectrum available for this technology is no more sufficient** to allow development of Fixed Wireless Access. At the same time, this circumstance already obliged Fixed Wireless Access vendors and operators to sharply increase efficiency in frequency usage, which on the other side decreased network scalability.

In other words, the following chart help us to resume the current situation of spectrum availability: in order to step up from yellow zone (present) to the green one, Fixed Wireless Access operators need to access more spectrum sources.

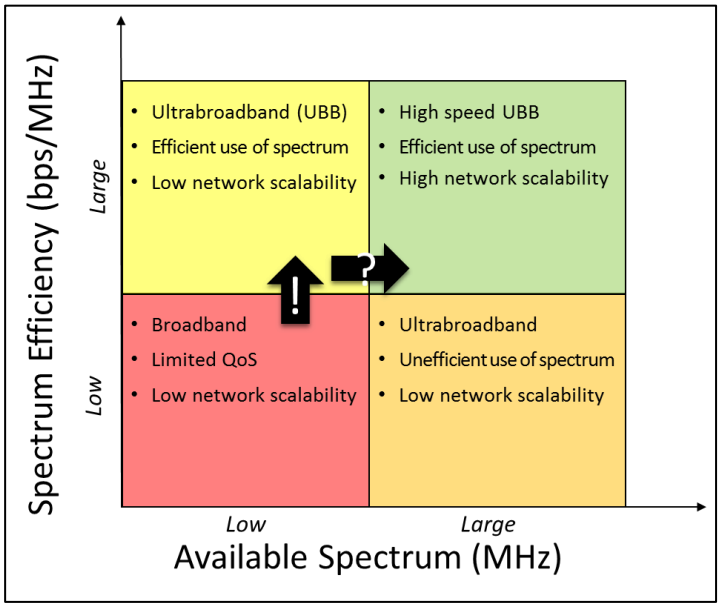

Figure 6: Prof. M. Dècina, Wireless Technologies (2016)

[13] Digital Single Market Strategy, par. 3.1

3.2 LEVERAGING ON FREE SPECTRUM AND SHARING MECCHANISMS

Far away from selected and valuable low spectrum bands and taking into consideration the wide part of frequencies already allocated to mobile operators[14], EOLO would like to suggests to the BEREC a **group of frequencies which appears fitting to Fixed Wireless Access services' needs. As clearly explained in the previous paragraphs,** promoting the availability of "protected" spectrum for FWA operators will support a widespread availability of UBB services in extra-urban/rural areas.

FWA Industry was founded and is growing based on the unlicensed spectrum's paradigm, for this reason EOLO believes this Industry **will be able to test and promote new assignment's paradigms based on shared spectrum**. The use of sharing spectrum (i.e. light licensing, LSA, three-tiered access, white spaces, etc.) will allow the FWA operator to use "protected" spectrum (to increase services' quality, capacity and stability) and to have a more efficient usage of this scarce resource. Moreover, a shared approach will be facilitated by technical configurations of FWA networks (with very few Watt-air potencies, less than 1 Watt) and their geographical locationing (rural areas where hills and mountains can be a natural protection to avoid interferences).

In order to allow the use of sharing mechanisms, **EOLO support the introduction of a real-time database on the spectrum usage**: this instrument will allow to promote spectrum's sharing avoiding (or, at least, reducing) interferences' issues.

Here below, **EOLO will suggest some frequencies' bands** where there is free or to be shared spectrum that could be assigned to FWA services.

The so-called "**5.8GHz band**" (5.725 – 5.875MHz) is currently underused from the Italian Ministry of Defense and could be very useful for FWA industry. In fact, this band is very close to the "5GHz band": FWA equipment (BTS and CPE) are already able to work in this band without any upgrade and so the assignment of this band to FWA services will provide new 150MHz without any additional investment for the operators. The 5.8Ghz could be used on an unlicensed basis only for TLC operator (to avoid the interference's problem occurring in 5Ghz) with the obligation to protect incumbent users (i.e. the Ministry of Defense).

600MHz and 700MHz are currently assigned to national and local TV-broadcasters. To avoid inter-operator interferences (600MHz) or international interferences (700MHz) there are some white spaces (in the alpine area and in the east coast of Italy) that could be exploited from FWA operators. In fact, these white spaces could have even 30-40MHz of free spectrum but on a very local basis so that they are not useful for a widespread deployment approach. Instead, FWA are deployed with a local approach and FWA operator are, in general, operating in a local or regional market.

2.3-2.4GHz is the elective band for LSA. Italy has already concluded a long test together with the Joint Research Centre of the European Commission (JRC), but the pilot project did not have a neutral approach

[14] Which frequently originated the so-called phenomenon of "over-hoarding".

from a technological point of view: the industrial partners all became from "mobile market (PosteMobile (Italy), Qualcomm Technologies Inc., Athonet, Nokia Networks, Cumucore, Fairspectrum and Red Technologies) and the scope of the pilot was to test coexistence's conditions for (fixed) incumbent services and TDD-LTE BTS. In order to support a full exploiting of the benefit of LSA, EOLO believes that BEREC should support a technology-neutral approach without any specific privileged technology.

3.4-3.6GHz was already assigned for WiMax services in 2008, but it looks still underused and with some problem of spectrum concentration in the hands of few (two) operators. In 2008, this band was assigned to several local and national operators, but WiMax technology did not take off as it was supposed to. For this reason a WiMax operator acquired a lot of spectrum from other licensed ones (Linkem has not less than 84MHz on a national basis, 2 blocks) and another one has the remaining national frequencies without an effective service's coverage (Aria 42MHz, 1 block)[15]. The tender had two mechanisms to avoid a spectrum's underusing (use-or-lose-it clause and a must access obligation on a commercial, but monitored, basis). EOLO believes that BEREC should promote a Ministry's investigation on this band to verify the effective usage and other anti-competitive phenomena (the tender had a frequencies' cap that obliged operators to collect no more than 1 block).

3.6-3.8GHz should be assigned to broadband services since 2012, but the Italian national Authorities still did not perform any procedure. In 2012 AGCom opened a public consultation but without any formal conclusion. After a very high market pressure, the NRA started a new consultation procedure in April 2015 and published its final Decision in December 2015. After AGCom decision, the Italian Ministry for Economic Development should have defined the details of the assignment's procedures and allocate this band, but (after 11 months) we are still waiting and there is not any official and binding related plan. Furthermore, the Ministry involved only one mobile vendor (Huawei) to test the technical conditions of the so-called "sharing framework"[16] so that to make FWA operators worried about it. EOLO believes that BEREC should monitor national assignment procedure to promote an efficient usage and to avoid any anticompetitive discrimination.

3.8-4.2GHz was paired to 3.6-3.8GHz when these frequencies were allocated to FDD fixed services. But now, 3.6-3.8 is already converted to TDD services and so 3.8-4.2GHz is unpaired and almost totally free of usages by now. Because of its affinity to 3.4-3.6 and 3.6-3.8 bands, these frequencies could be favorable used by FWA operators: it looks very appropriate to allocate all 3.4-4.2Ghz frequencies to UBB/BB fixed services because it could reduce interferences issues and promote a more efficient use of the spectrum (the same equipment could work in a wider band). Moreover, 3.8-4.2GHz looks an interesting band

[15] The tender assigned 3 blocks.

[16] The NRA Decision divides the spectrum (200MHz) in two parts: the A-blocks and the B-blocks. A-blocks are divided in 4 lots of 50MHz each: A1-urban and A2-urban to be assigned in the biggest cities, A1-territory and A2-territory to be assigned in the extra-urban areas. The B-blocks will be assigned in a very local basis (regional or sub-regional) in order to allow the coexistence with incumbent services. So the AGCom Decision withdraw the first assignment procedure with a geographical LSA approach, an important occasion to test LSA that could effected by a wrong sharing framework. The sharing framework has to define the technical limitations and the coexisting rules between urban-territory (in A-blocks) and between incumbents-new entrants (in B-blocks).

(because of some, few, incumbent fixed usages) to implement innovative regulatory approaches based on sharing mechanism: i.e. the three-tiered access framework adopted by FCC for 3.5GHz or a light licensing model where the frequencies' assignments are performed on a BTS basis.

The following table summarizes the EOLO proposals on the useful spectrum for FWA networks.

Band (MHz)	Range (MHz)	Note
600 - 700	**MHz on very local basis**	• Local and National Broadcasting • There should be quite large white spaces in very local areas
2.300 - 2.400	**100**	• Licensed Shared Access band • Trial started by Italian Ministry of Development should include FWA
3.400 – 3.600	**200**	• Allocated to few operators • Scarcely used in remote areas
3.600 – 3.700	**100**	• Scarcely used in the whole country • Should be already allocated since 2008[17]
3.700 – 3.800	**100**	• Empty band • Should be already allocated since 2008
3.800 – 4.200	**200**	• Empty band since no more coupled with 3.6-3.8 GHz
5.725 – 5.875	**150**	• Scarcely used by Ministry of Defense • Close to 5.4 GHz already used by FWA operators

[17] As asked by Commission in Del. 2008/411/CE and 2014/276/UE.

CONCLUSIONS

Taking in account all the previous considerations on:

- **difficulties** observed **in reaching the DAE 2020 targets**, which highlights the importance of **Fixed Wireless Access** industry, notably in sub-urban, rural and remote areas;
- **perspectives of FWA** technologies and related role **within the 5G strategy;**
- need of **more spectrum** to enhance FWA contribution in granting **universal access to ultra-broadband.**

EOLO asks the BEREC to

1. **promote net neutrality in the wireless industry**, by fostering the development of 5G wireless networks, whether mobile and fixed;
2. **preserve frequency bands currently allocated to Fixed Wireless Access** operators from changes in destination usages (3.4-3.6 GHz, 3.6-3.8 GHz, 24.5 – 26.5 GHz and 27.5 – 29.5 GHz), included those addressed to RadioLan shared access (2.4 GHz, 5.6 GHz and 17.2 GHz);
3. act to find **new spectrum resources for FWA operators**, in order to enhance their contribution to full deployment of universal ultrabroadband access (i. e. 600-700MHz, 2.3-2.4 GHz, 3.8-4.2 GHz, 5.8 GHz);
4. **initiate a more meaningful dialogue and increased cooperation with the FWA industry**, like the one that is already in place with the mobile industry;
5. allow single Member States to **gradually e differently reserve spectrum bands for 5G** fixed deployment.

EOLO
Head of Public Affairs, Regulation & New Business
Antonio Rita