

**Huawei Response of
REPUBLIQUE TUNISIENNE
INSTANCE NATIONALE DES TELECOMMUNICATIONS**

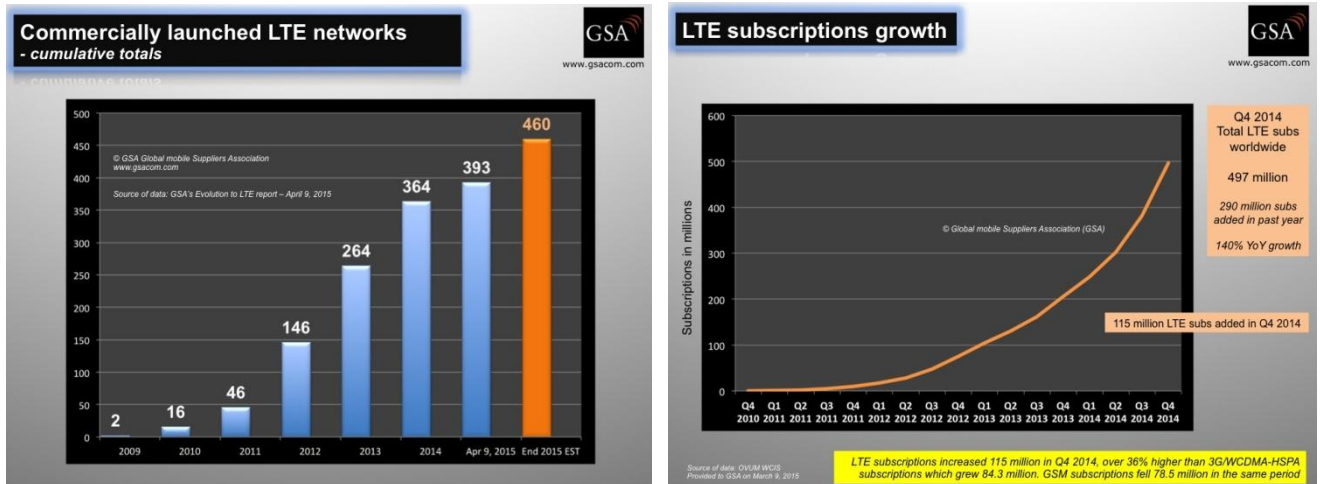


**Consultation publique sur l'opportunité d'attribution
de licences pour l'installation et l'exploitation de
réseaux mobiles de quatrième génération (4G) en
Tunisie**

Mars 2015

Question.1. Que pensez-vous de cette analyse ? Souhaiteriez-vous la compléter avec plus d'éléments se rapportant à l'évolution du marché du haut débit ?

Huawei Response:



By April 2015, the No. of LTE commercial networks globally already reached 393 (Source from GSA report). By end of 2015, this number is anticipated to grow to 460.

138 countries have commercial LTE networks launched by 393 operators. There are totally 181 countries (including the 138 countries mentioned above) which have issued LTE licenses (including 5 countries for trial Licenses).

By Q4 2014, worldwide LTE subscribers have reached 497 million, among which 115 million LTE subs added in Q4 2014, 36% higher than 3G/WCDMA-HSPA subs which grew 84.3 million during the same period.

Take China as an example, LTE is warmly embraced by markets. MIIT issued LTE operating license to China Mobile on December 4, 2013. The company then deployed over 700,000 base stations to cover 1 billion populations. The company announced 100 million LTE subscriptions by end January 2015. China Mobile anticipates its LTE subscriptions base will be 250 million by end of 2015.

LTE becomes the strong driving force for the ICT industry and the whole country's GDP. The broadband network will accelerate the other industry's information system transformation, like Cloud, Video Conference, E-Education, E-Health, Security Surveillance, etc. But current Fixed Broad Band network performance in Tunisia is not good enough to satisfy the end users. The LTE will have much high data rate which can satisfy the high end user needs and it will also help to accelerate fixed network transformation.

Question.2. Que peut-on attendre du déploiement des réseaux mobiles à très haut débit sur les plans économique, social et culturel ?

Huawei Response:

65% of consumers now use their personal device for work related purposes while on the move, which improves the efficiency for the economy. LTE provides this segment of consumers with

better quality of service and speed.

In terms of eCommerce, 4G users are three times more as likely to shop in shopping seasons on their phones as compared to 3G users. This will help boost the retail industry and logistic industry.

LTE also enables people to share the joy and excitement with their social connections. For the first time during big public events where upload is exceeding download.

LTE can inspire increased video streaming when users are on the move and the number of users who make use of public Wi-Fi hotspots are decreasing significantly.

LTE provides the possibility for security surveillance in the city, the broadband on bus, remote health and education, etc..

Question.3. Au vu de la description précédente, quelles stratégies devraient être préconisées pour créer un écosystème favorable au développement de la 4G ? En termes de terminaux ? En termes d'applications et de contenu ?

Huawei Response:

The foundation to create a 4G ecosystem is a 3 phased development strategy. In the early phase, delivering extensive population coverage through fast deployment should be the operator's prime objective. After coverage is delivered, a quality network to deliver the best performance which will enable the operator to emerge as the top brand in the face of competition should be the next priority. Furthermore, for the operator to be able to stay ahead of the competition, the near future has to be considered where the operator needs to look at how to deliver the best user experience while incurring the lowest amount of cost.

As for terminals, 44% new smart phones released in 2014 are LTE capable. 4G Entry Smartphone is booming (in 2014 some LTE smart phones cost as low as 100 USD).

Services and applications like e-health, Mobile Office, Remote monitoring and Surveillance, High definition mobile video conferencing, e-car, e-education and several others, are most prospective applications powered by 4G.

Another aspect of LTE that is accelerating is service innovation, with operators like SK in South Korea introducing services like cloud gaming and cloud navigation services. With Verizon USA and UK EE both introducing mobile data sharing plan and double speed plan respectively.

As for Mobile video application, eMBMS has been introduced to enhance the cell edge coverage of broadcast channels and guarantee the efficiency of data transmission to help ensure the efficient provision of mobile video. One merit of eMBMS is that the consumption of bandwidth does not depend on number of users who are watching the content at any point in time but depends on the number of channels the mobile operator is using to broadcast the content. .

With regards to ecosystem eMBMS chipsets were readily available as of end of 2013 and most major smartphones will support eMBMS in 2014.

Question.4. Jusqu'à quel point est-il pertinent de retenir la 4G pour assurer la

couverture des zones de développement prioritaires du pays dans le cadre d'une politique de service universel?

Question.4. To what extent is it appropriate to retain 4G to ensure coverage of priority development areas of the country as part of a universal service policy?

Huawei Response:

According to understanding of Tunisia mobile market and experience in countries of Mediterranean region, Tunisia is leading in region with MBB high penetration, heavy usage and fast growth. However 3G construction is still focusing in main populated areas, remote village and country side is in shortage of broadband access. As fix broadband is not easily reached due to lack of fiber in these areas, 4G is an excellent approach for broadband remote accessing, especially 4G in low band like DD800 or 450M.

So as a summary of Huawei's suggestion, the first priority is to deployment 4G in main populated areas where are currently covered by 3G for better user experience and traffic offload in the first phase. For the second phase, provide universal service by deploying 4G in low band like DD800 or 450M to reach extensive coverage nationwide.

Question.5. Quelles politiques tarifaires devraient, selon vous, favoriser le développement de la 4G ?**Huawei Response:**

LTE provides much higher data rate than 3G, and there are two main types of LTE offers among the operators.

First type, 3G data and 4G data are in one package, there no price different per bit for 3G and 4G, end user will consume more data where has LTE network and operator will get more revenue. This type is popular in advanced countries.

Second type, 4G offer is independent package, and the LTE throughput is guaranteed. But normally, the price is higher than 3G.

Question.6. Quel serait selon vous le timing idéal d'attribution des licences 4G en Tunisie ? Quels éléments influent, selon vous, sur les niveaux des tarifs des services 4G ?**Huawei Response:**

Based on Huawei's investigation and understanding of Tunisia market, 4G license is suggested to be allocated as soon as possible due to below reasons:

- 1) LTE ecosystem is matured, by the end of 2014 there are more than 360 LTE networks commercially launched and over 44% newly shipped smartphone support LTE, with the minimum price of 100 USD.
- 2) 3G networks in Tunisia is now heavily loaded and is not able to cater the traffic booming of coming years due to spectrum limits in 2.1GHz which is now used by UMTS 2100MHz. 45MHz

of 2.1GHz allocated, only 15MHz is not assigned, which means 33% maximum capacity can be increased by 3G.

- 3) Tunisia market, which is characterized by high MBB penetration, heavy usage and fast growth, is quite similar to its neighbor country Morocco. In Morocco, LTE license is commercially allocated recently to all mobile operators.

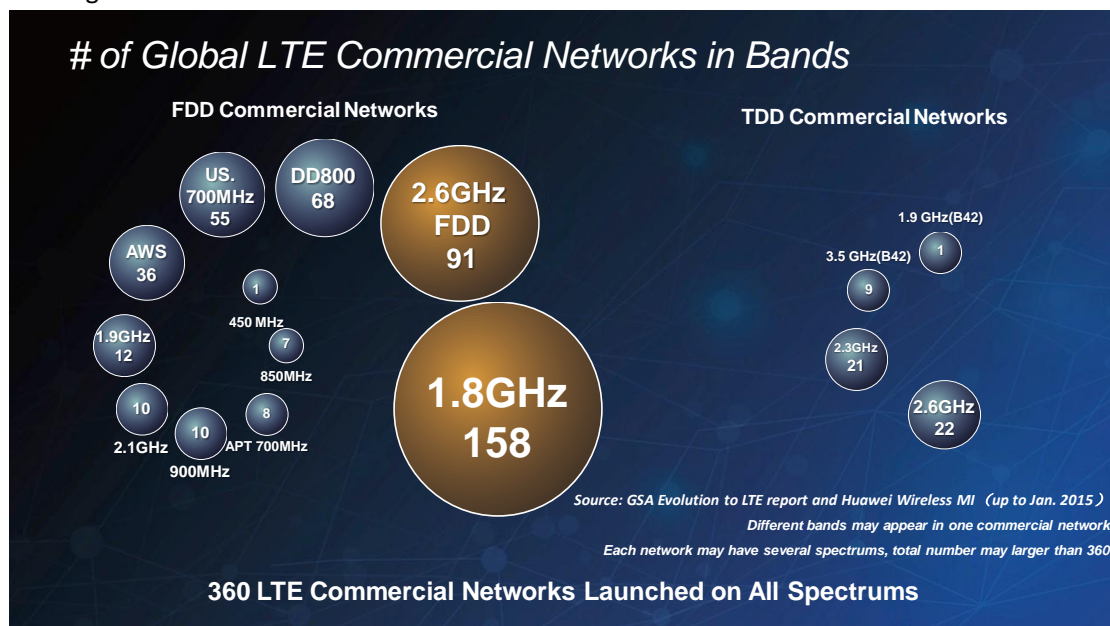
Actually many factors will affect level of service rates in 4G, the most important one is spectrum allocated to operators, for example:

- 1) 20MHz can reach 150Mbps peak rate while 10MHz bandwidth can reach only 75Mbps peak rate, based on 2x2 MIMO;
- 2) Technologies used in LTE also affect service rate like high order MIMO, CoMP, CA, etc.

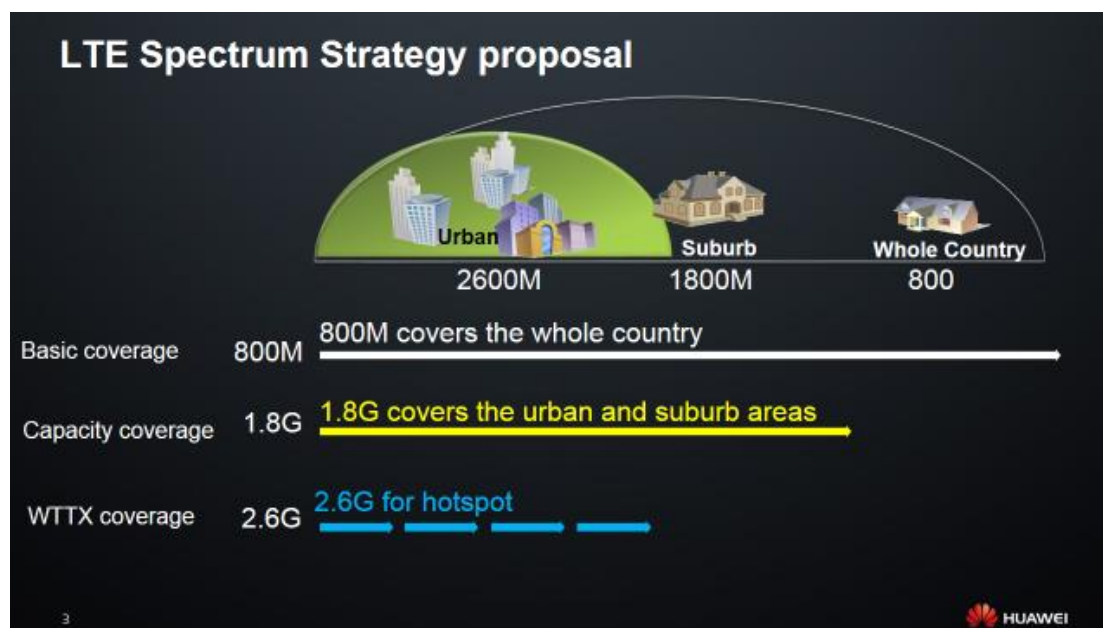
Question.7. Quelle est votre choix de bande de fréquence parmi les bandes identifiées pour le déploiement efficace de la 4G ?

Huawei Response:

According to latest investigation of GSA, 1.8GHz is the most popular band in LTE FDD, while 2.6GHz is ranking NO.2, DD800 is also a popular spectrum in FDD LTE especially for 4G extensive coverage.



For Tunisia, it is suggested that DD800 (or 450MHz), 1.8GHz and 2.6GHz are the first choices for LTE license allocation. DD800 (or 450MHz) for extensive 4G coverage to provide universal service and 1.8GHz for traffic offload in main populated areas could be allocated in the first stage, 2.6GHz could be an option in the second stage for larger capacity in some very hot areas. The spectrum policy adopted by most operators is shown in below image:



Question.8. Quelle est votre analyse quant à l'utilisation des bandes de fréquences actuellement disponibles pour la fourniture des services 4G en Tunisie ?

Huawei Response:

As the answer for question# 7, for Tunisia, it is suggested that DD800, 1.8GHz and 2.6GHz are the first choices for LTE license allocation. 450M for extensive 4G coverage to provide universal service. D800 and 1.8GHz for traffic offload in main populated areas could be allocated in the first stage, 2.6GHz could be an option in the second stage for larger capacity in some very hot areas. In the long term, when there is big booming of data, the 2.3GHz TDD can be also allocated, because it has much wider spectrum and provide much higher capacity.

Question.9. Que pensez-vous du principe de neutralité technologique par rapport à la bande de fréquence utilisée ?

Huawei Response:

Some opinions in industry is noted for INT's reference about technological neutrality.

1) Opinions of EU:

Frequency control policy reform in EU will meet two objectives: first, to use spectrum freely, which means that the technical and operational neutrality; secondly, to increase the spectrum trading and the establishment of the spectrum market. In the first half of 2009, the EU introduced an ambitious plan of action as soon as possible so that Europe can benefit from the "digital dividend" (790MHz ~ 862MHz band) in. The EU requires all member states to achieve since 2012 transition from analog TV to digital TV, and thus the resulting release of the "digital dividend" band, stimulate the development of wireless services. In March 2012 the European Parliament has adopted a five-year radio spectrum policy program, which calls for the January 1, 2013, all EU Member States (unless the individual has obtained an exemption prior to that date)

should be authorized to 700MHz band for wireless broadband communications. The European Commission estimates that use of the band if they can unify the "digital dividend" EU area before 2015, the next 15 years will bring 20 billion to 500 billion euros of the economic interests of the EU.

2) Opinions of ITU and GSMA:

ITU and GSMA experts to share the current situation throughout the telecommunications industry, suggested that the Government and the telecommunications regulatory authorities should develop an active strategy to promote the healthy development of the industry, such as: the development of an earlier LTE spectrum policy allows operators to clear earlier LTE development plan and have more time to prepare for commercial LTE spectrum technology neutrality, operators can freely use their spectrum, accelerating technological evolution to meet customer demand.

Question.10. En fonction de la bande de fréquence utilisée, quelle technique de multiplexage (TDD/FDD) devrait être adoptée?

Huawei Response:

The DD800 and 1800MHz can be assigned to 3 operators equally for FDD technology. Enough of them can have 10MHz@DD800 + 10MHz@1800MHz. In which case, 10MHz+10MHz CA to reach 150Mbps theoretical throughput and it is much higher comparing with 42Mbps HSPA+ now. In the second stage, 2.6GHz FDD or 2.3GHz TDD can be considered. For example, 20MHz@2.6GHz for each operator, it can offer 150Mbps more throughputs. 60MHz@2.3GHz for each operator which can offer 450Mbps more throughputs!

Question.11. Quelle est, selon vous, la quantité minimale de spectre contigüe dont chaque opérateur doit disposer pour répondre aux nouveaux besoins du marché du très haut débit mobile? L'agrégation de porteuses dans une même bande ou dans deux bandes (800, 1800 MHz) vous paraît-elle une solution adéquate pour répondre à ces besoins ?

Huawei Response:

10M as the minimum spectrum quantity for operator to launch MBB service, due to Huawei experience, more than 95% operator launch LTE service with more than 10M bandwidth around global market; and narrow band(5M/3M) LTE no obvious advantage than 3G for end user;

Mobile operators continue to seek efficient and cost-effective solutions to support the high demand for data and next-generation services. Spectrum continues to be a limiting factor. A majority of operators have spectrum allocations of less than 20 MHz contiguous spectrum or have multiple bands or non-contiguous spectrum blocks. As a solution, operators worldwide are adopting CA technology, which is one of the main features of LTE-Advanced in Rel-10.

- The first commercial CA deployments were in 2013 in South Korea, where SK Telecom aggregated 20 MHz of 800MHz and 1.8GHz spectrum to achieve peak DL rates of 150Mbps. LG UPlus followed a month later

- In November 2013, EE in the U.K. launched 40 MHz of inter-band CA with 300 Mbps theoretical speeds
- Australian mobile operator Optus was the first to deploy CA on a TD-LTE network in December 2013 [19]. Several other operators held trials or announced plans to deploy CA such as A1 Telekom in Austria, Softbank Japan, CSL Limited Hong Kong and Telstra Australia
- In North America, AT&T announced CA capability in Chicago and plans for other markets in aggregating 2100 MHz and 700 MHz spectrum to deliver 15 MHz of DL spectrum [20]. Sprint plans to use CA as part of the Sprint Spark service to combine LTE spectrum across the 800 MHz, 1900 MHz and 2.5 GHz spectrum. T-Mobile & Verizon plan to use carrier aggregation to further enhance their AWS spectrum holdings
- Apple, Samsung, LG and HTC have launched CA-capable devices such as the Samsung Galaxy S 4, Note 3, LG Pro2, the HTC One M8 and Apple iPhone 6 and 6 Plus
- CA also has great potential for future developments such as increased number of component carriers, bands and bandwidths, enabling aggregation of FDD, TDD, licensed and unlicensed spectrum. In September 2014, China Telecom announced the successful completion of an FDD-TDD CA demonstration.

For Tunisia's situation, each operator can only get 10MHz for 1800MHz or 800MHz, so the CA is not feasible only in Single Band@1800MHz or @800MHz, but CA in two bands are feasible. If each operator can get more than 40MHz in one band, this Single Band CA can be feasible.

CA evolution roadmap:



Question.12. Quelle version LTE vous parait-elle adéquate pour assurer l'efficacité de l'opérateur et répondre au mieux aux besoins du marché tunisien ?

Huawei Response:

Huawei Suggestion: we propose 3GPP Release 11, it's the latest LTE commercial version, all LTE services compatible and can smooth evolve to future

For LTE, Rel-11 provides enhancements to the LTE-Advanced technologies introduced in Rel-10, such as:

- Carrier Aggregation (CA)
- Multimedia Broadcast Multicast Services (MBMS) and Self Organizing Networks (SON)
- Introduction to the Co-ordinated Multi-Point (CoMP) feature for enabling coordinated scheduling and/or beamforming
- Enhanced Physical Downlink Control Channel (EPDCCH)
- Further enhanced Inter-Cell Interference Coordination (FeICIC) for devices with interference cancellation

Finally, Rel-11 introduces several network and service related enhancements (most of which apply to both HSPA and LTE):

- Machine Type Communications (MTC)
- IP Multimedia Systems (IMS)
- Wi-Fi integration
- Home NodeB (HNB) and Home e-NodeB (HeNB)

Question.13. Quelle est selon vous la quantité de spectre minimale/maximale à attribuer à chaque opérateur par bande ?

Huawei Response:

Spectrum in Morocco is listed below for INT's reference.

Les fréquences retenues pour chaque soumissionnaire, compte tenu de la licence dont il est recommandé d'être attributaire, sont comme suit (par ordre alphabétique):

<i>(en MHz)</i>	Licence attribuée	Bande 800 MHz		Bande 1800 MHz	Bande 2,6 GHz
		Phase 1	Phase 2		
Itissalat Al-Maghrib	Licence B	[801–806] [842–847]	[801–811] [842–852]	[1725–1735] [1820–1830]	[2520–2540] [2640–2660]
Médi Telecom	Licence A	[796–801] [837–842]	[791–801] [832–842]	[1775–1785] [1870–1880]	[2540–2560] [2660–2680]
Wana Corporate	Licence C	[806–811] [847–852]	[811–821] [852–862]	[1750–1760] [1845–1855]	[2500–2520] [2620–2640]

As mentioned in reply to question11, a minimum spectrum of 10MHz per band is suggested to each operator; for the maximum spectrum depends on the availability of remained bandwidth for LTE, price of spectrum auction, operator's willing to invest on LTE, etc. Typically 20MHz per band is the most common case in other countries.

Question.14. Selon vous est ce que chaque operateur doit disposer d'une quantité de spectre dans chaque bande ouverte pour la 4G ? Si non, quel sera l'impact du fait d'avoir des fréquences dans une seule bande sur le pouvoir concurrentiel d'un opérateur donné ? Est-ce que vous voyez que l'obligation d'itinérance sera suffisante pour combler cette différence ?

Huawei Response:

It is important to notice that 4G operators need to guarantee both coverage and capacity. Low bands (<1GHz) provide great coverage but do not bring sufficient capacity. High bands (>1GHz) can deliver significant capacity; however the high frequency bands propagation is less attractive than the one from low bands.

Therefore the country regulator needs to precisely set the 4G coverage conditions depending on:

- The frequency to be allocated
- And the economic aspect in terms of the number of 4G eNodeBs being required to meet the coverage requirements

The following diagram gives an indication about the current 4G spectrum allocation in Western Europe. It clearly indicates that a mix of low bands and high bands is a comprehensive strategy for most of 4G operators.

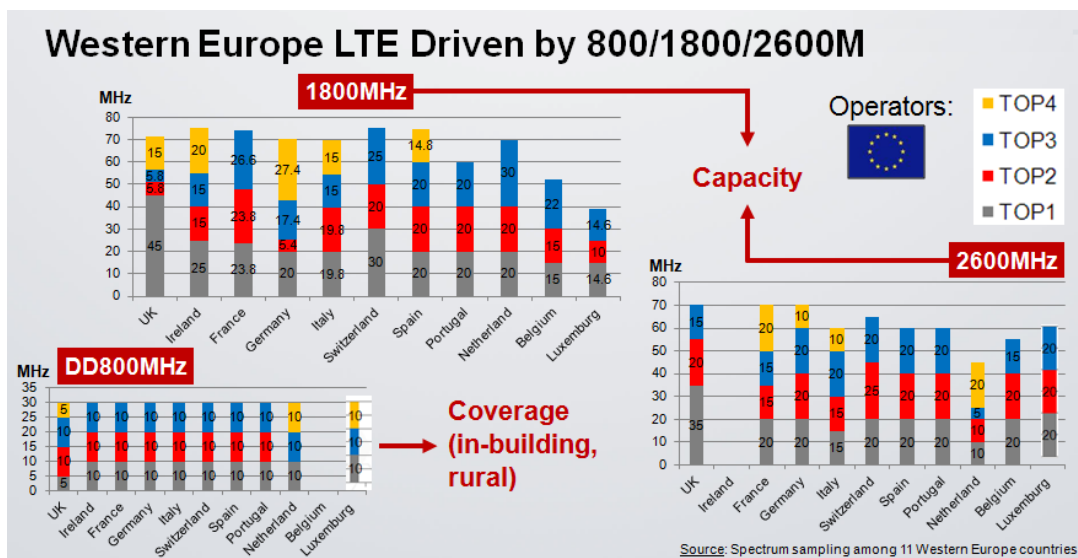


Figure X: Western Europe Spectrum Allocation for 4G Services

In Q1-2015 Morocco regulator has allocated DD800, 800MHz and 2600MHz to all 3 incumbent operators. It is closely aligned with Western Europe spectrum strategy for 4G operators.

In case operators do not secure both low bands and high bands for their 4G services then they will have to compromise in terms of capacity and coverage such as:

- If 4G operators do not have low bands then they will need to « compromise » the 4G coverage. Especially coverage milestone will need more base station to be deployed. In addition it is obvious that 4G coverage will never be able to meet 100% of the population due to the very high number of eNodeB being needed. In that situation they have the possibility to offer seamless coverage in using 3G (or 2G) coverage in areas where 4G coverage is not possible.
- If 4G operators do not have high bands then they will face challenges for addressing the capacity requirements depending on the 4G traffic growth. In that case operators will have to

densify their 4G networks in adding more eNodeBs and reducing the ISD (Inter Site Distance). They still could face severe challenges in hotspot areas in handling very high data traffics at the busy hour.

The national roaming (« obligation d'itinérance ») could partly solve this issue in the case 4G operators have high bands (however with some compromises in terms of users experience; 2G or even 3G network capabilities are not equivalent to 4G capabilities).

In case of low bands the national roaming (« obligation d'itinérance ») cannot solve the capacity requirements.

Question.15. Que pensez-vous de la possibilité d'introduire un quatrième opérateur en Tunisie pour la fourniture des services 4G ?

Huawei Response:

Tunisia regulator needs to decide and specify a set of rules in case a 4th 4G operator license award. The following table summarizes these rules.

Key Considerations for 4th 4G License	Description
4G Spectrum Assets	4G operators need to deal with coverage and capacity. As per today spectrum availability and capabilities it is required to allocate a mix of low band (<1GHz) and high bands to each operator (whatever incumbent or greenfield). Indeed low bands (<1GHz) can provide a consistent coverage across the country and high bands are qualified for bringing enough capacity in DU/Urban areas.
4G Coverage	<p>The country regulation needs to precisely indicate the 4G coverage requirements which should be mandatory for the new operator in order to launch 4G services and get the benefit for national roaming in the country via one of the incumbent operators. Therefore the country regulator should clearly indicate</p> <ul style="list-style-type: none"> • T0 (Launch Date): Mandatory population coverage to be required before 4G services launch • T0+2Years: % population coverage • T0+5Years: % population coverage • T0+8Years: % population coverage • etc. <p><i>Note:</i> it is obvious that coverage conditions closely depends on frequency bands being allocated.</p>
Site Acquisition for 4G (Radio Site Sharing)	One of the most important challenges for new 4G operator is to negotiate the site acquisition for deploying 4G eNodeB. A possibility is to allow (and regulate) the radio site sharing

	<p>among all operators (new operator and incumbent operators). Therefore the country regulation should decide a regulation for radio site sharing. It should include all technical conditions as well as rental fee for sharing the radio site.</p>
4G RAN Sharing (Optional)	<p>If the regulator agreed RAN Sharing then it could give more flexibility for the new entrant to team-up with one of the legacy operators for deploying the 4G RAN</p>
Services Launch Conditions (4G Data)	<p>Country regulator has to pay attention to:</p> <ul style="list-style-type: none"> Regulation for requiring a minimum % of population coverage before 4G service launch (<i>note</i>: if the % is too high then it could challenge new operator as rollout is time consuming e.g. sites acquisition) Regulation for data services continuity in case of no 4G coverage in some parts of the country. In case of services continuity requirement, there is a need to interconnect the new operator 4G core to one of the legacy mobile operators' core network (3G and most likely 2G as well). Interfaces for interconnection are defined by 3GPP
Services Launch Conditions (4G Voice)	<p>LTE offers 2 options for offering voice services (typically for smartphone users):</p> <ol style="list-style-type: none"> <u>CSFB</u>: That means 4G users have to re-connect 3G (or 2G) networks for all voice calls. Currently the 4G smartphones eco-system is quite mature for CSFB (several hundreds of commercial smartphones being commercially available) <u>IMS eSRVCC</u>: If there is 4G coverage then voice call is routed through the 4G network. In case 4G coverage is missing then the call is handover from 4G to 3G (or 2G) <p>In both cases there is a need to get voice services continuity across 3G (or 2G) in some point of time. Therefore the country regulator should allow users from the new operator to connect (at least) one of the legacy mobile operators. Note that for both cases there are specific 3GPP specifications dealing with interface settings between 4G EPC core and 3G (or 2G) core. They are mandatory interfaces to be setup.</p>
Interconnection to 2G, 3G, PSTN (4G voice services)	<ul style="list-style-type: none"> Mandatory regulation for having the rights to interconnect all legacy mobile and fixed operators The country regulation should address both technical rules and interconnection fee
Interconnection to International Internet Gateway (4G Data Services)	<p>Mandatory regulation for having the possibility to connect international Internet gateways within the country</p>
National Roaming for 4G	<p>It is quite important for new operator to get national roaming agreement with one of incumbent operators (for data and voice</p>

	<p>services). The country regulator has to supervise this agreement in order to make sure that national roaming is implemented without any obstacles. The country regulator has to « draft » the conditions for allowing the new operator to benefit for the national roaming (e.g. new operator needs to have a sufficient 4G coverage at launch e.g. 1/3 of the population coverage). In addition the regulator should define all rules to guarantee that national roaming will be guaranteed for several years (for example 7, 8, 10 or 12 years).</p>
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Above rules need to be balance for avoiding following situations:

- If above rules bring too much advantages to the new operator then it is obvious that incumbent operators could suffer a lot. In the worse case the weakest mobile operator could fail to continue its business operations.
- It above rules does not « protect » enough the new operator then there is a high risk that the new operator will fail to secure a minimum market share.

Therefore the country regulator needs to precisely evaluate the impact for each rule on the local market as per the table above.

Up to now there are few cases where 4G services have been launched by new operators. They are e.g.:

- Smile Tanzania (DD800MHz): 4G services launch on 05-2012
- Smile Uganda (DD800MHz): 4G services launch on 10-2012
- Smile Nigeria (DD800MHz): 4G services launch on 06-2013 (note: Nigeria Regulator is planning to auction 2600MHz FDD in coming months)
- Algérie Télécom Algeria (1800MHz): 4G services launch on 05-2014
- SWAN Slovak Republic (1800MHz, 3500MHz): 4G services have been launched on 13-03-2015 (on-going national roaming agreement implementation; please refer to the following press release about SWAN 4G services status:
<https://www.telegeography.com/products/commsupdate/articles/2015/03/13/swan-launches-a-s-fourth-mno-with-unlimited-4g-data-offer-still-lacks-voiceroaming/>)
- Smile Democratic Republic of Congo (DD800MHz): 4G services launch in 2015
- Reliance Jio India (850MHz, 1800MHz, 2300MHz): 4G services launch is planned during H2-2015. Reliance Jio has been able to sign a national roaming agreement with RCOM India. In addition Reliance Jio is deploying its 4G eNodeBs in using RCOM radio sites in order to speed up its 4G rollout and optimize its OPEX

Note that BT UK is not part of the above new 4G operators list due to the on-going BT UK acquisition of EE UK. Currently BT UK sells 4G services in UK in using 4G MVNO agreement across EE UK 4G network.

Question.16. Y'a -t -il selon vous un espace économique suffisant à l'entrée du quatrième acteur sur le marché tunisien ? Si oui, selon quel modèle économique ?

Avec quelles cibles commerciales et quels niveaux de couverture ?

Huawei Response:

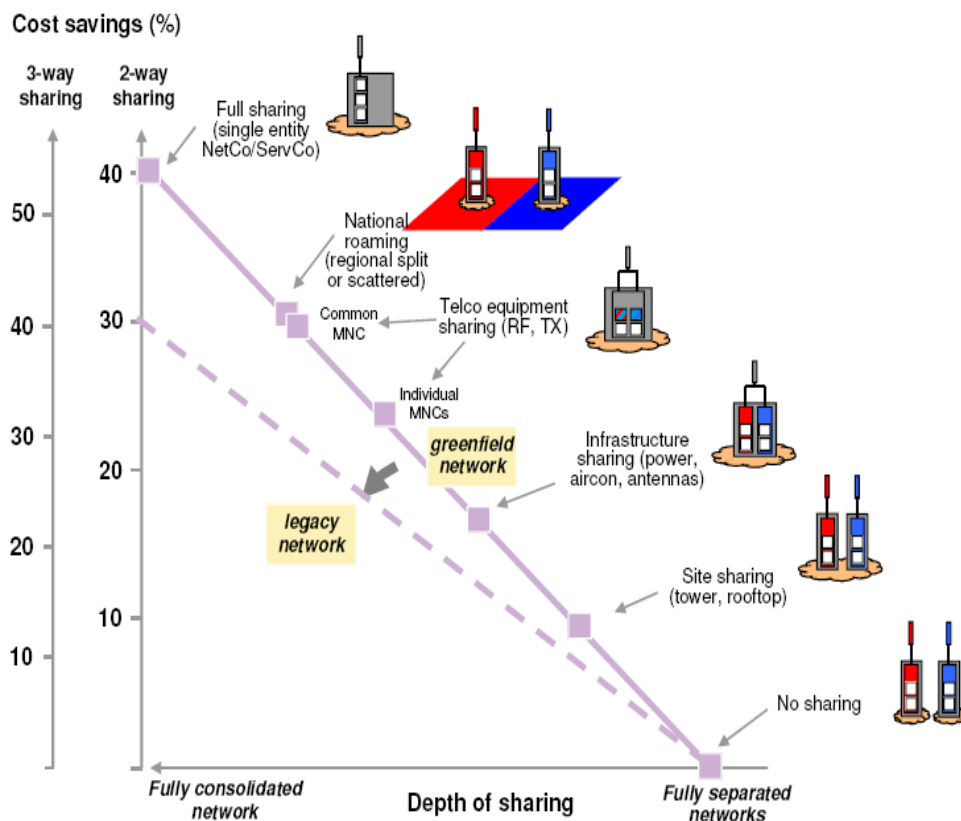
It is needed to precisely evaluate the parameters which have been discussed in the answer to Question #15 for Tunisia market. Especially there is a need to carefully look at both technical aspects as well as business aspects evolution (data and voice ARPU evolution depending on the operators market share, price cut in case of price war among operators, etc.). There is a need to simulate the impact of 4th 4G operator in Tunisia for each rule being set. These simulations need to address both impacts:

- For the new operators
- For each incumbent operator

Question.17. Dans quelle mesure le partage des infrastructures passives et actives constituerait une garantie pour les opérateurs ayant obtenu des licences 4G ?

Huawei Response:

Both passive and active sharing is available for LTE technology. Sharing will definitely save the TCO between operators. There are different levels of sharing as the following chart, the site sharing & Infrastructure sharing are the passive sharing, which is easier to realize. And Telco equipment sharing is the most popular active sharing, but it is more complicated to manage and operation.



Question.18. Comment le partage des sites opérant dans les bandes 900 Mhz et 1800Mhz (2G/3G) devrait il constituer un avantage permettant d’optimiser les CAPEX ?

Huawei Response:

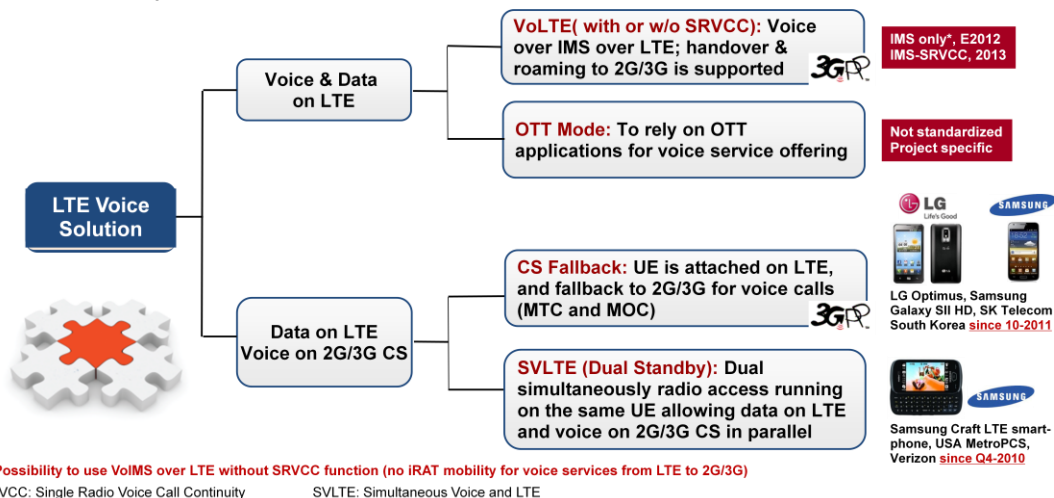
As the answers for question#17, the current site sharing in Tunisia is infrastructure sharing, the sharing operators will share the cost for site acquisition, renting, master/tower and antennas. Another important reason is it is very difficult to obtain new site, so it is good for operators to share their site to each other to provide better coverage.

Question.19. Est-ce que la fourniture du service voix doit obligatoirement être associée à la définition de la couverture radio-mobile ?







Huawei Response:

The most common case in industry for voice service on LTE is that for the very beginning of LTE service launch, mainly focus on data service and user fallback to 3G network when request for voice service (CSFB); In the matured phase of LTE, evolve to VoLTE and users can initial voice service on LTE through pure PS domain.

LTE Voice Solution Options:



Operators voice over LTE approach and strategies:

GSM/UMTS Operator	LTE launch date for data services	LTE CSFB launch date	VoIMS over LTE (fixed BB scenario)	IMS/SR-VCC solution
 at&t	09-2011	10-2011 2 smart-phones @launch 8+2 smart-phones (02-2012)		Planning in 2013
 Bell	09-2011	11-2011 2 smart-phone @launch 3 smart-phones in 02-2012		Planning in 2014
 Bt Co Mo	12-2010	Q4-2011 3+1 smart-phones @launch		Planning in 2013
 SK telecom	07-2011	10-2011 (1 st worldwide) 2 smart-phones @launch	2012/08	Planning in 2013
 TELUS	02-2012	02-2012 2 smart-phones @launch		Planning in 2014
 vodafone Germany	12-2010	03-2012 1 smart-phone @launch	WiFi/2G/HSPA/LTE home router	Planning in 2013H2

Source: Operators' web sites for commercial services and press releases

Now most of operators select voice on 2G/3G, but VoLTE is the trend and final solution for all operator, till end of 2014, there are 14 commercial VOLTE network and 66 trials VolTE around world.

Question.20. Quels mécanismes devraient être implémentés pour favoriser le développement du service voix et garantir une concurrence saine à son égard ?

Huawei Response:

OTT voice and SMS is a big challenge for operator, but 4G is not the reason to make it worse.

Because the requirement of OTT voice or VoIP's bandwidth is low, from 30Kbps~120Kbps, it can be supported by 3G already.

Second, the OTT voice or VoIP's QoS is not guaranteed, LTE voice can fall back to 2G or 3G, which will impact the experience of the users.

Third, HD Voice can be provided by 3G or 4G, which MOS>4. This will improve voice experience a lot.

In the opposite, 4G will help operator to increase their revenue by much higher quality service services, and benefit from the data booming.

Question.21. Dans quelle mesure la portabilité des numéros représente -t- elle une garantie de développement d'une concurrence saine avec la 4G?

Huawei Response:

For mobile operators, the number portability includes two major scenarios: 1. MNP between mobile operators; 2. MNP between different technologies for the same operator. For Tunisia government it is expected to improve Tunisia people's feeling of happiness with enhanced user experience or accelerated new service adoption stimulated by MNP. For mobile operators, MNP can enlarge the competition space for 2nd and 3rd largest operator. If MNP to be introduced, NP central management center should be established by Tunisia government, each mobile operator should support the core network upgrade. In North Africa, Senegal and Cape Verde has started planning or deployment of MNP led by Ministry of Telecommunication.

The MNP technology is not relevant with LTE. For guarantee healthy competition with 4G, we recommend to have a review of the market positions of 3G operators to determine the optimal MNP strategy for Tunisia.

Question.22. Comment caractériser la couverture attendue avec le déploiement des réseaux mobiles à très haut débit ? Doit-on préconiser une couverture nationale ? Par région ? Des niveaux de couverture différents mais complémentaires pour les différents opérateurs ? Doit on prioriser certaines zones ?

Huawei Response:

4G is a network provide much higher data rate, there is no essential different in front of common users. As the answers for question#15, 4G coverage could require step by step as example:

- T0 (Launch Date): Mandatory population coverage to be required before 4G services launch
- T0+2Years: % population coverage
- T0+5Years: % population coverage
- T0+8Years: % population coverage
- etc.

But different operator covers different region won't be affair solution even with the complementary coverage from other operator. In this case, the market space is restricted and competition condition is not the same.

No limitation of regions for different operators is recommended, the operator will deploy the 4G coverage where has higher priority of need and the affair condition of competition will improve the service of quality and development of 4G.

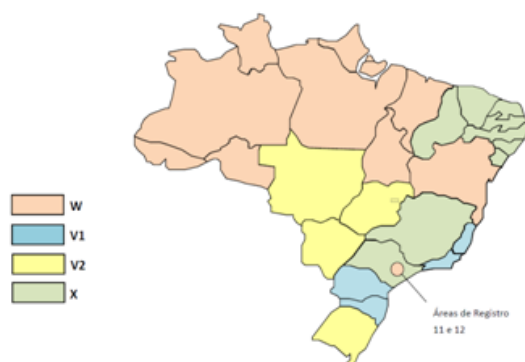
Question.23. Considérez-vous opportun de préconiser des obligations de couverture orientées vers les zones non couvertes par la 3G ?

Huawei Response:

As understanding of huawei this question implies INT's concerns about nationwide universal service. The ROI(Return of Investment) for LTE to cover the rural area is low, only the lower band(450M) is suitable for this scenario.

A similar case in Brazil is quoted for INT's reference, Brazil's regulator allocated 450M bounded with 2600MHz free of charge to local operators, and coverage obligations were requested to all operators in different areas by each operator.

Band	Frequency	Winner	Area	Price MBRL
450 FDD	451Mhz to 458Mhz 461Mhz to 468Mhz	Claro	W	Bounded with 2600
450 FDD	451Mhz to 458Mhz 461Mhz to 468Mhz	TIM	V1	Bounded with 2600
450 FDD	451Mhz to 458Mhz 461Mhz to 468Mhz	Oi	V2	Bounded with 2600
450 FDD	451Mhz to 458Mhz 461Mhz to 468Mhz	Vivo	X	Bounded with 2600



Coverage requirement

- 30% of the cities until June 2014
- 60% of the cities until December 2014
- 100% of the cities until December 2015
- Offer data connections of 1Mbps DL and 256kbps UL until December 31st 2017

Question.24. Quels types d'indicateurs de qualité de service doivent faire part des obligations des opérateurs 4G pour chaque service? Doit-on inclure la notion de débit minimum garanti par classe de service?

Huawei Response:

Normally from regulator's point of view, some key indicator could be adopted to guarantee QoS. Some most important indicator are listed below:

- 1) Coverage probability, for example 95% in urban and 80%~90% in rural
- 2) Minimum guaranteed data rate at cell edge, for example typically 3Mbps~5Mbps in downlink and 512kbps~1Mbps in uplink.
- 3) Peak data rate

In developed market like EU, the third part test (P3) is introduced to QoS evaluation and ranking for each operator, the results will inform to users in public media, for the purpose of activating competition between operator and improving network quality.

Question.25. Quel modèle économique est-il préférable de préconiser dans les zones moins denses pour la fourniture des services 4G (joint venture, opérateur d'infrastructures, négociations commerciales) ?

Huawei Response:

As understanding of huawei this question implies INT's concerns about nationwide universal service. A similar case in Brazil is quoted for INT's reference, Brazil's regulator allocated 450M bounded with 2600MHz free of charge to local operators, and coverage obligations were requested to all operators in different areas by each operator.

Question.26. Quel type de concurrence est il préférable pour l'attribution des fréquences ? Une attribution par bande séquentielle, simultanée couplée ou simultanée séparée ?

Huawei Response:

It is better to allocate the spectrum equally to all operators at the same time. Because the 3G market is mature, and the market share are stable. If any operator who has better spectrum or earlier license, he will take better position of 4G market.

According to Tunisia's current spectrum allocation, the following spectrum assignment is recommended:

Operators / Spectrum	License Stage	Tunisie Telecom	Ooredoo	Orange
DD800 FDD	Stage 1	10MHz	10MHz	10MHz
1800MHz FDD	Stage 1	10MHz	10MHz	10MHz
2.6GHz FDD	Stage 2	20MHz	20MHz	20MHz
2.3GHz TDD	Stage 3	60MHz	60MHz	60MHz
3.5GHz TDD	Stage *	40MHz	40Hz	42Hz

Stage 1, all operators to solve the coverage issue by 10MHz@DD800, and capacity need by 10MHz@1800MHz, and DD800+1800MHz CA(max 150Mbps) can be deployed depends on the need of traffic.

Stage2, when LTE market is mature and traffic grows fast, 20MHz@2.6GHz can double the capacity. And operator can choose to deploy 3 Carrier CA DD800+1800MHz+2.6GHz (max 300Mbps).

Stage3, when the big booming of data comes, 60MHz@2.3GHz TDD can provide max 450Mbps by 3 Carrier CA.

Stage*, 3.5GHz WiMAX is currently used by TT and Orange, but WiMax ecosystem is ended now. It is recommended to change to 3.5G LTE TDD to continue providing their enterprise business.

End of document

Huawei Technologies Tunis

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