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Telecommunication

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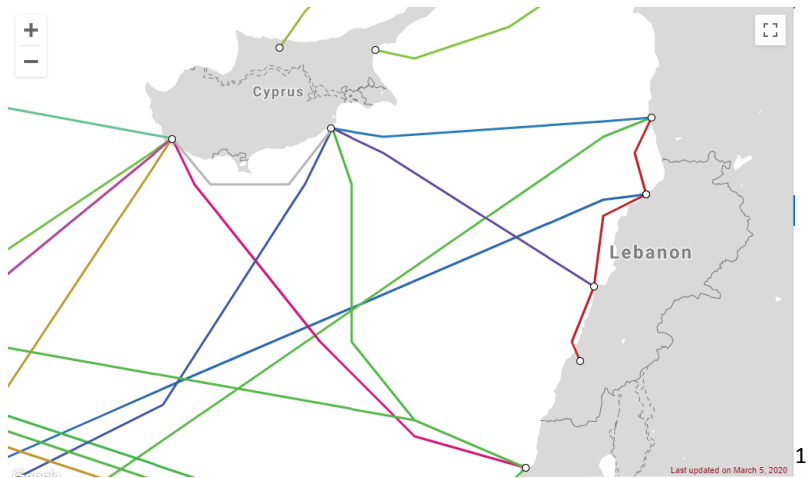
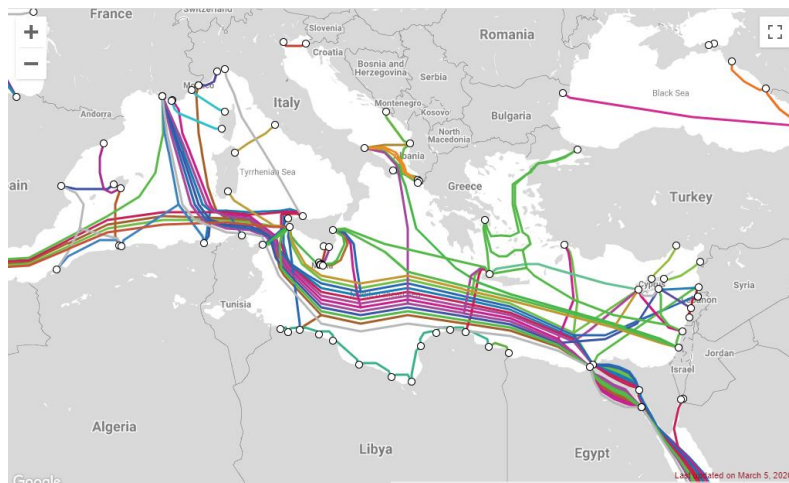
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1. Telephone



The I-ME-WE (India-Middle East-Western Europe) submarine communication cable linking Tripoli, Lebanon with other countries.



There are 1,816,262 landlines giving a relatively high fixed line penetration rate, along with 4,890,534 mobile telephones in use in Lebanon. The telephone system was severely

¹ <https://www.submarinecablemap.com/>

damaged during the civil war but was completely rebuilt and revamped. The systems that provide the infrastructure for the telephone network are, domestically, microwave radio relay stations and cables, and internationally, two Intelsat satellite-earth stations, a microwave radio relay station to Syria and three international undersea fiber optic cables: I-ME-WE, CADMOS (to Cyprus), and BERYTAR (to Syria).

2. Free radio and television broadcasting

Lebanon possesses one AM radio broadcast station, and 32 FM radio broadcast stations. In 2005, there were 28 privately owned FM radio stations. One FM station, which shifts between French, English, and Armenian, and the sole AM radio station, which broadcasts solely in Arabic, are owned by the state-owned Radio Lebanon, which is under the jurisdiction of the Ministry of Information. Radio Lebanon also relays Radio France International at 13:00 (UTC) daily. Among private broadcasters are Mix FM, PAX Radio, the Lebanese Broadcasting Corporation (LBCI), National Broadcasting Network, Radio One, and the Voice of Tomorrow. There are 2.85 million radios in Lebanon. In 1998 Lebanon's radio penetration rate was 906 radios per 1000 people. Furthermore, Lebanon has five digital cable television companies, Cable Vision, Digitek, EcoNet, City TV and UCL.

There are 28 television broadcast stations in Lebanon, although the application of the audiovisual law has caused the closure of a number of TV stations. The PAL television standard is used in Lebanon. Other than the state-owned Télé Liban, most broadcasters are privately owned and earn revenues from advertising. Some of the most important television networks are the LBC, Murr TV, Al Jadeed, Future TV, Orange TV (OTV), Al-Manar, NBN, Télé Lumière, and Télé Liban (State-owned). There are 1.18 million television sets in Lebanon.

3. Paid radio and television

There are five cable TV companies in Lebanon: Cable Vision, Eco Net, City TV, Digitek and UCL.

4. Internet services

The development and growth of internet infrastructure has been particularly slow in Lebanon due to corruption and allegations of a sector monopoly.

Internet services are administered in Lebanon by the Ministry of Telecommunication. Lebanon provides three types of services: dialup services, wireless Internet service and ADSL. Lebanon ranks 161 on the netindex.com (as of 1 February 2019).

5. ADSL services

ADSL was offered for the first time in April 2007 and there were, as of July 2011, 1,284,361 subscribers. The ADSL network has been undergoing large upgrades throughout the country. The addition of the new IMEWE underwater cable during the summer of 2011

has dramatically increased Lebanon's international bandwidth capacity, allowing for increased speeds and larger data caps. The prices for ADSL varies slightly depending on the DSP but typically cost from \$16/month (4 Mbit/s) to \$65/month (open speed) on unlimited data plans.

To fix the problem, the Ministry of Telecommunications signed an 18-month contract with Consolidated Engineering & Trading and French/American Company Alcatel-Lucent to install a Fiber Optics grid. It was expected that by the end of 2011 all the areas of Lebanon will have fast internet ranging from 10–15 Mbit/s download, and 20 Mbit/s and more will be available the year after, allowing Lebanon to finally catch up with the rest of the world, which eventually never happened. A new fiber-to-the-home initiative was launched in 2015 by the Ministry of Telecommunications under Boutrous Harb. It is expected to be fully implemented by 2020, presenting users with VDSL2+ plans capable of offering speeds reaching 150Mbit/s.

6. Broadband Internet

Wireless Internet services were offered for the first time in 2005 to palliate for the absence of an ADSL infrastructure at the time. ISPs fees revolve around \$45/month. Wireless internet is portable: users can connect nearly anywhere through a receiver (connected to the client via USB or Ethernet) and it provides download rates between 2 Mbit/s and 9 Mbit/s depending on the chosen plan. Coverage weakens in densely built areas or remote locations.

7. ISPs (Internet Services Providers)

There are 17 licensed ISPs (Internet Services Providers) and 9 licensed DSPs (Data Service Providers) operating in Lebanon:

- Broadband Plus
- ComNet
- Cyberia
- Data Consult (Managed Services Provider)
- Farah Net
- Fiberlink Networks
- IDM
- Keblon
- Lebanon OnLine
- Masco Group
- Mobi
- Moscanet (Wise)
- Onet Plus
- Pro Services

- Sodetel
- Solidere
- Terranet
- Transmog (Cyberia)
- Tri Network Consultants
- Virtual ISP (VISP)

8. DSPs (Data Service Providers)

Cable One, Cedarcom, GlobalCom Data Services, Pesco, Sodetel, Solidere, LCNC S.A.L., TRISAT S.A.R.L., Waves S.A.L.²

9. Statistics

9.1. Landline

IN NUMBERS



1,012,849

the total number of landline subscribers

142,849

new landline subscribers between 2014-2015, it was 15,000 compared to 2012-2013

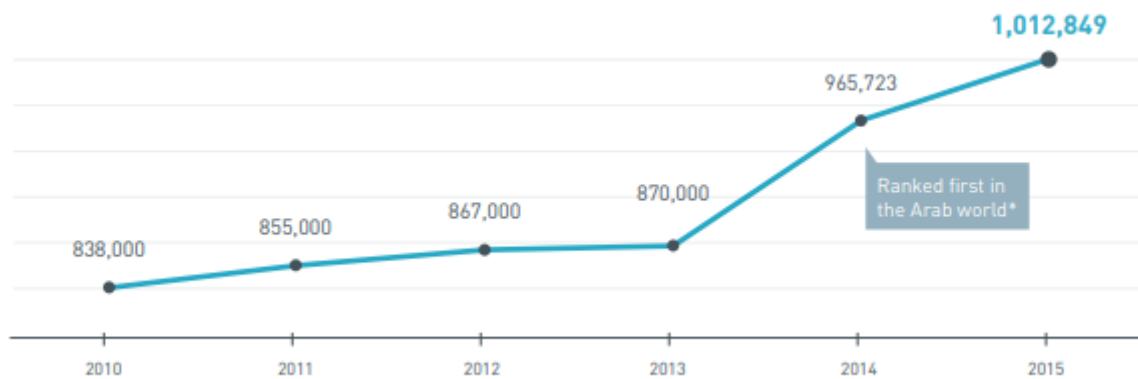
198

new subscribers per day between 2014-2015, compared to 21 in 2012-2013

843%

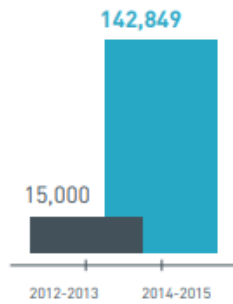
increase of new landline subscribers

Landline Subscribers

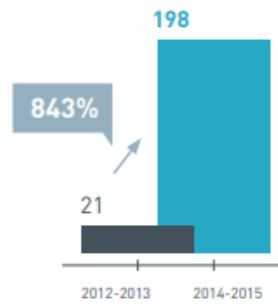


² https://en.wikipedia.org/wiki/Telecommunications_in_Lebanon

The number of new landline subscribers



The daily average of new subscribers



9.2. Internet



1,244,384
the total number of internet subscribers

764,384
new internet subscribers compared to 77,671 between 2012-2013

1061
the average of new internet subscribers per day in 2015, compared to 107 between 2012-2013

93,5%
the coverage ratio of fixed-network the DSL and the VDSL technologies

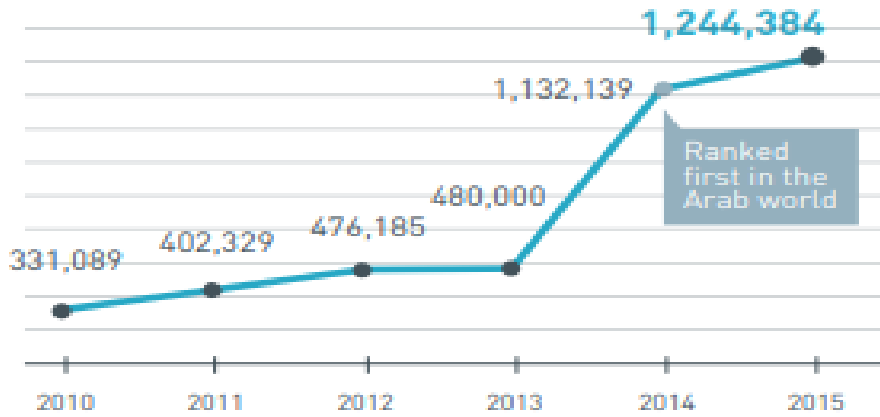
67%
of the internet users are subscribed to 2 and 10 MB/S compared to 13% in 2013

70,000 E1
the volume of international internet capacities shows an increase of 442% compared to 2013

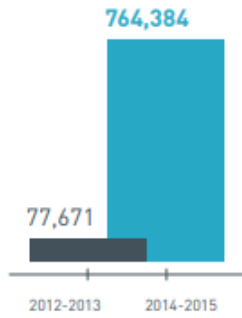
39,200
E1s is the total international internet bandwidth dedicated to private ISPs show an increase of 570% compared to the year 2013

422%
increase in E1 numbers compared to 2013

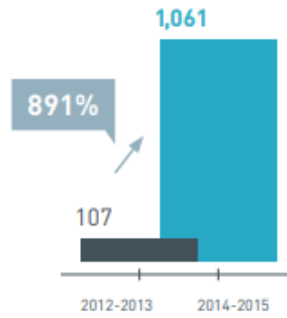
The total number of broadband internet subscribers



The number of new broadband internet subscribers

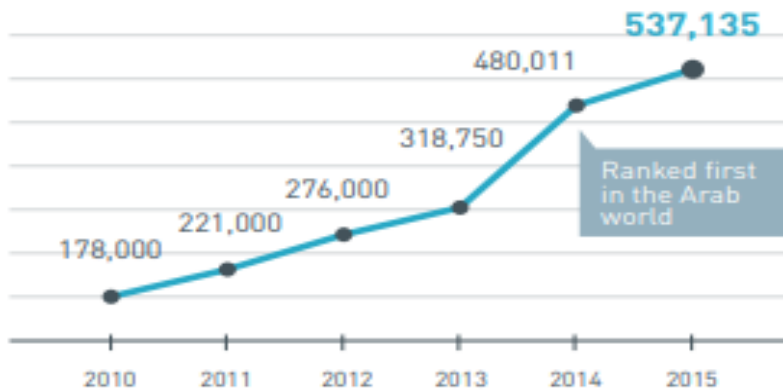


The average of new broadband internet subscribers per day

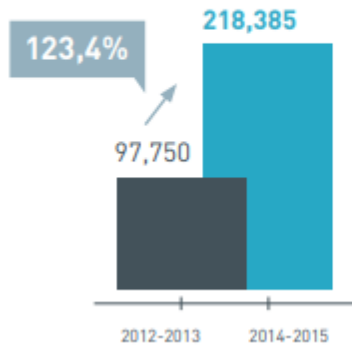


9.3. DSL

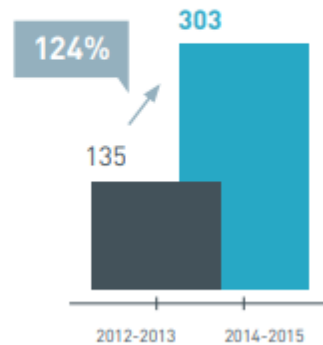
The total number of DSL subscribers



The number of new DSL subscribers



The daily average of DSL subscribers



93,5%

of central offices are equipped with DSL-VDSL technologies

74 new central offices were equipped with DSLAM technology in 2014-2015.

The total number of central offices with DSLAM technology reached 244 in 2015, up from 170 in 2013. Thus, 93.5% of central offices in the country became equipped with the DSL-VDSL technologies.

The total number of phone central offices with DSLAM technology

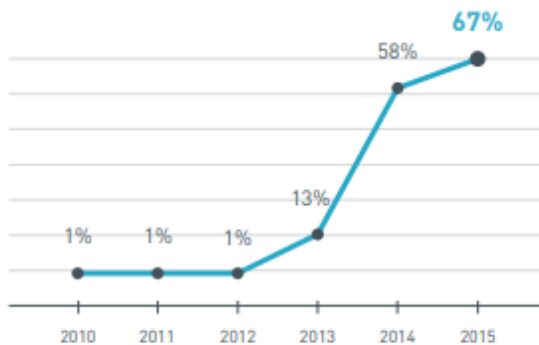


67%

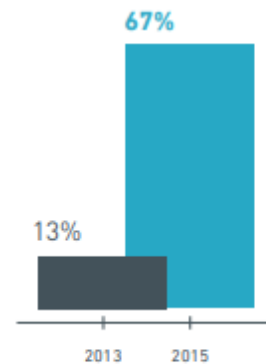
of subscribers with internet speed between 2 and 10 Mbps

Increasing internet speeds was a strategic goal for the Ministry of Telecommunications. Decisions taken to this effect contributed to having 67% of internet subscribers with a subscribed speed between 2 and 10 Mbps in 2015 as opposed to 13% in 2013, showing an increase of 415%. (Despite the limitations of the existing copper network which was gradually being replaced by optical fiber)

Broadband internet subscriptions
(between 2 and 10 MB/S)



Broadband internet subscription
(between 2 and 10 MB/S)

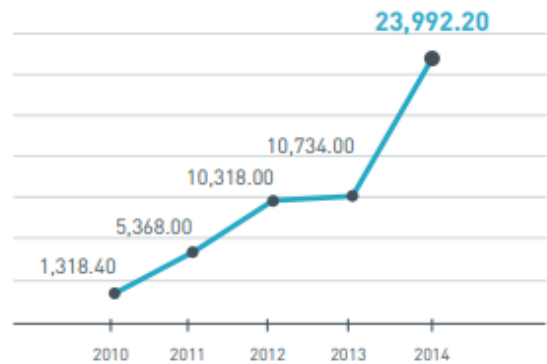


23.99 Kbps

the average international internet bandwidth of fixed internet service in the year 2015

Given the the increase in subscribed bandwidth and the rise in demand for bandwidth consumption, the Ministry, in 2014, increased the international internet bandwidth so that its average per internet user reached 23.99 Kbps, recording an annual increase of 421% compared to 10.73 Kbps in the year 2013.

International internet capacities for every subscriber

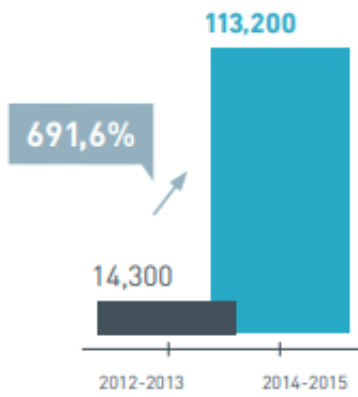


244%

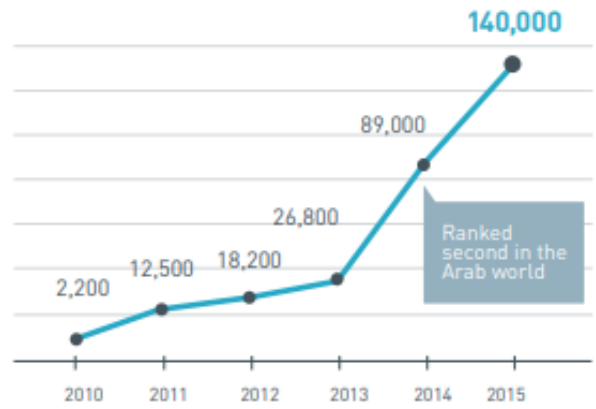
The total international internet bandwidth increased by 244% to reach 70,000 E1

Having held the second rank worldwide in terms of the average international internet bandwidth growth rate in the year 2014, the total international internet bandwidth in 2015 reached 70,000 E1, an increase of 422% vs 2013 (a total international bandwidth of 13,400 E1)

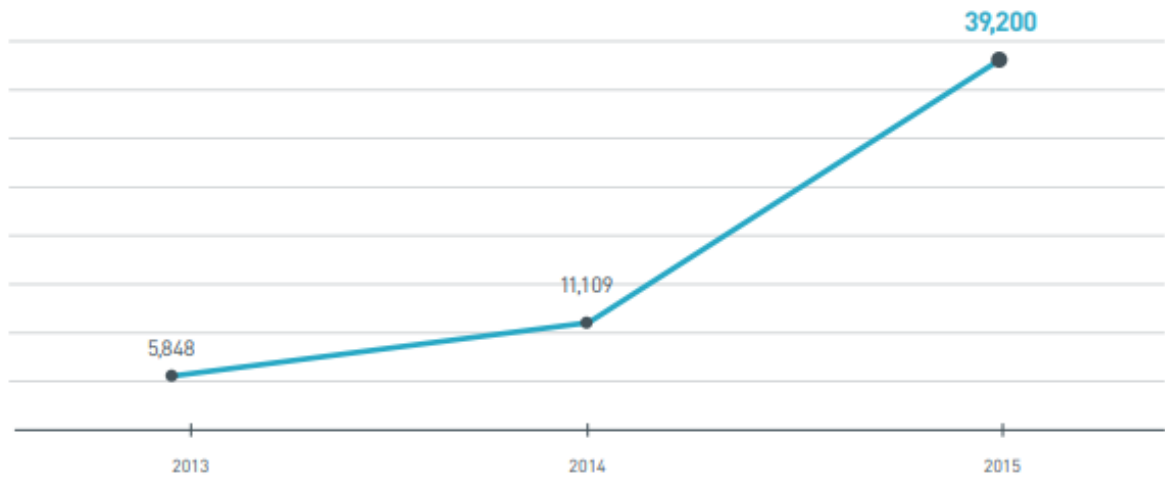
The growth of international internet capacities



The volume of international internet capacities



Total number of E1s dedicated to Internet Service Providers ISPs



9.4. Mobile cellular



Mobile cellular

4,504,631

the total number of mobile cellular subscribers

339,183

new mobile subscribers

1250

new data mobile cellular subscribers per day

65 TB

the daily data consumption

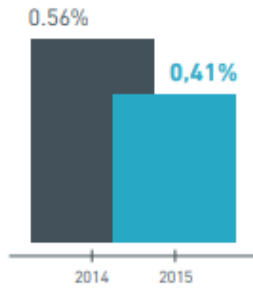
94%

penetration rate of mobile cellular

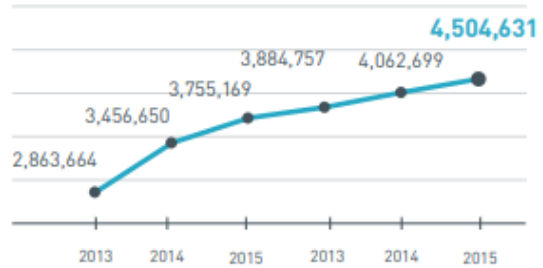
\$65 M

increase in total state revenues from the mobile sector compared to the year 2013

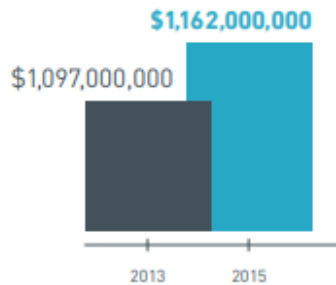
Dropped call rate



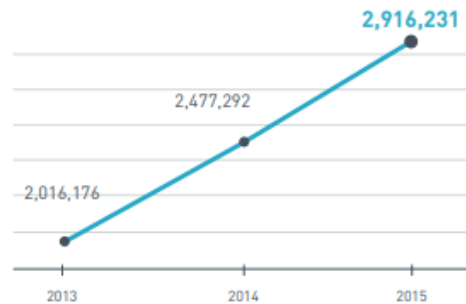
Number of cellular phone subscribers



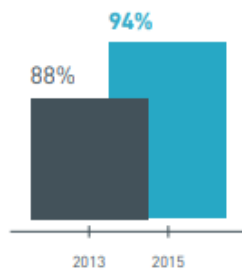
Revenues of the mobile sector



Number of data subscribers



The penetration rate of mobile phones



94%

Penetration rate of mobile phones in 2015

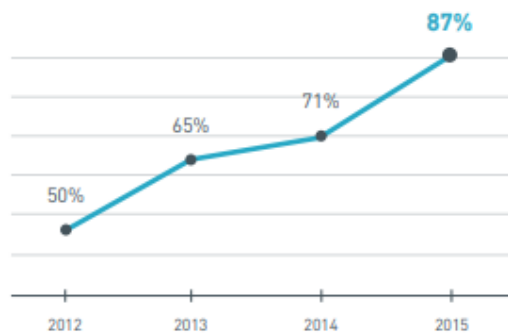
The 6% increase in mobile phone penetration reaching 94% in 2015, compared with 88% in 2013, was the direct result of the Ministry's decision to expand mobile services through the improvement of the infrastructure in sites that had not been covered by mobile services.

87%

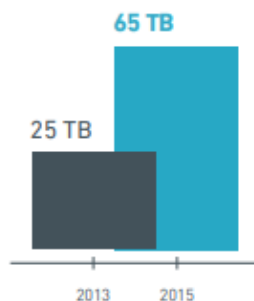
the penetration rate of smart devices

The penetration rate of smart devices increased to 87% in 2015 up from 34% in 2013. The increase in the number of mobile data subscribers coincided with a provision to make the necessary data capacity available.

The penetration rate of smart devices



The daily data usage



65 TB

the daily data usage

A 61% increase in daily data usage reaching 65 TB in 2015; an increase from 25 TB in 2013.

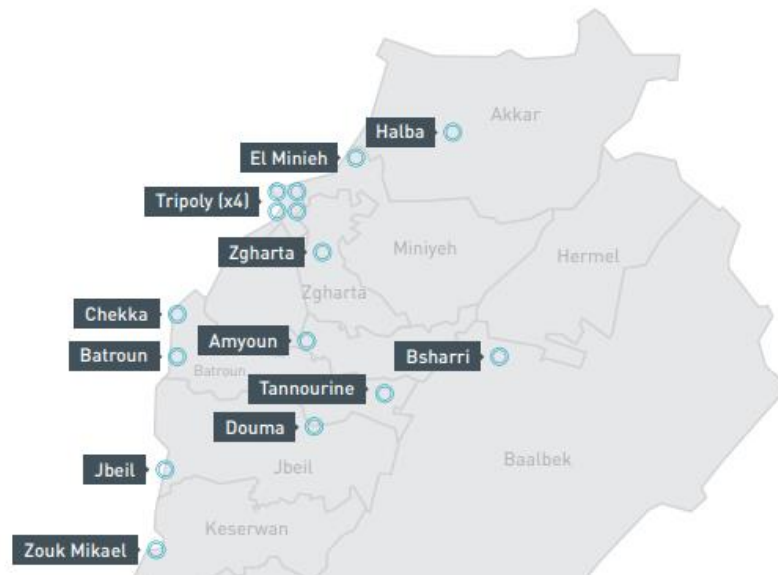
9.5. Telecom One Stop Shops (OSS)

Common sale centers (Telecom One Stop Shops) for Alpha, Touch and Ogero were set up to provide fixed and mobile telecommunications services. Telecom One Stop Shops were the first

moment of truth in the process of developing and modernizing the telecommunication services; be it for fixed or mobile networks. The OSS were the implementation of the decentralized and sustainable management strategy that allowed consumers to experience improved services at a much lower cost across the Lebanese territory, be it at urban centers or rural areas. The One Stop Shops implementation plan consisted of three phases. Twenty-six centers out of a planned thirty-six were set up as part of the OSS operation.

Operational telecommunication OSS Zouk Mikayel, Jbeil, Miniyeh, Halba, Tripoli (4 centers), Batroun, Zgharta, Bcharreh, Amioun, Douma, Tannourine, Elyssar, Badaro, Aley, Hazmieh, Shekka, Jdeideh, Antelias, Mazraah, Sidon, Zahleh, Chtoura, Saghbin. These newly introduced common centers for Alpha, Touch and Ogero provided consumers (citizens, residents and tourists) various services, namely the sales of fixed and mobile mobile lines, internet services, bill settlement, and prepaid cards, among others. In addition to the existing 44 centers, 19 new Ogero centers were set up and in full operation bringing the total number of Ogero offices to 63 nationwide.

The geographic distribution of the Telecom One Stop Shops



9.6. The fixed network: the transition from copper wire to fiber optics (FTTX)

This strategic objective aimed to connect homes, institutions, office buildings, and neighborhoods with the “FTTX” technology, which has become standard in developed countries. That objective required the development of the telecom national network infrastructure, namely the “local loop” as well as the “last mile”. It also required a complete transition from the current copper network to the optical fiber network: Ambitious developments that were to be implemented according to a tight schedule based on technical and economic criteria associated with the cost of implementation and existing quality of service.

Fiber to the Office or Organization **FTTO**

Fiber to the Node **FTTN**

Fiber to the Cabinet or the Curb **FTTC**

Fiber to the Building **FTTB**

Fiber to the Home **FTTH**

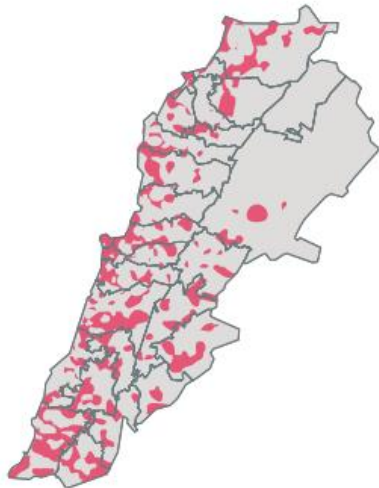
Directive Plan FTTH Phase 1



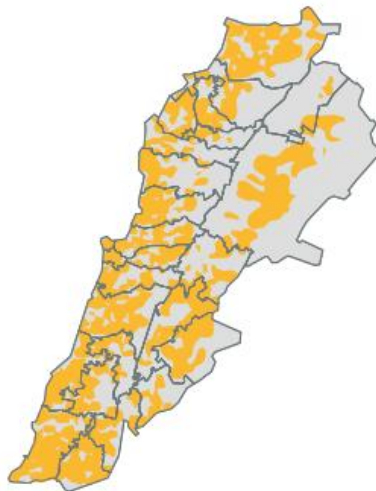
Directive Plan FTTH Phase 1-2

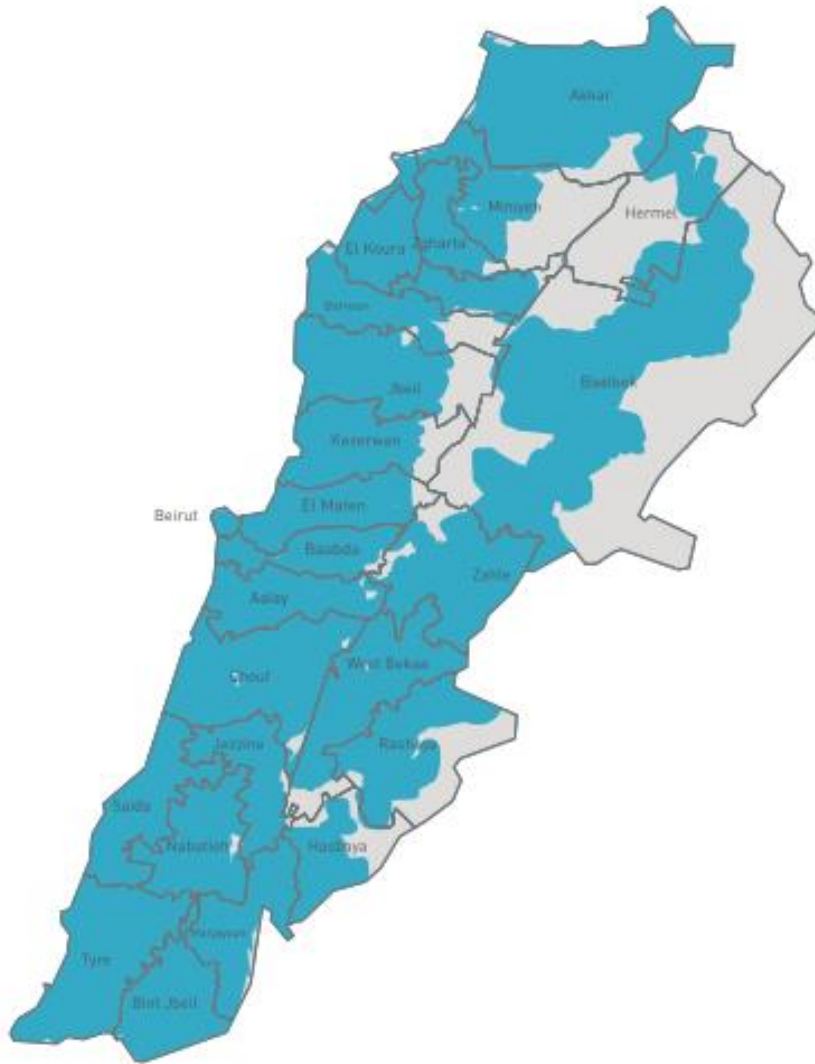


Directive Plan FTTC Phase 1

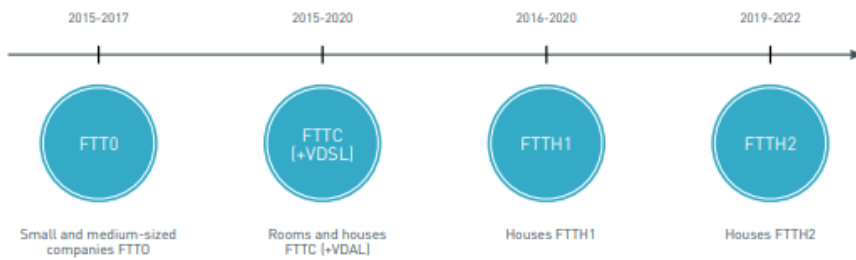


Directive Plan FTTC Phase 1-2





The road map



9.7. The mobile network: the transition from the third generation (3g) to the fourth generation (4g advanced)

ALFA

The situation at launch 1/7/2014
39% of inhabited areas are covered by 4G network



ALFA

After implementation
97,2 % of inhabited areas are covered by 4G network



TOUCH

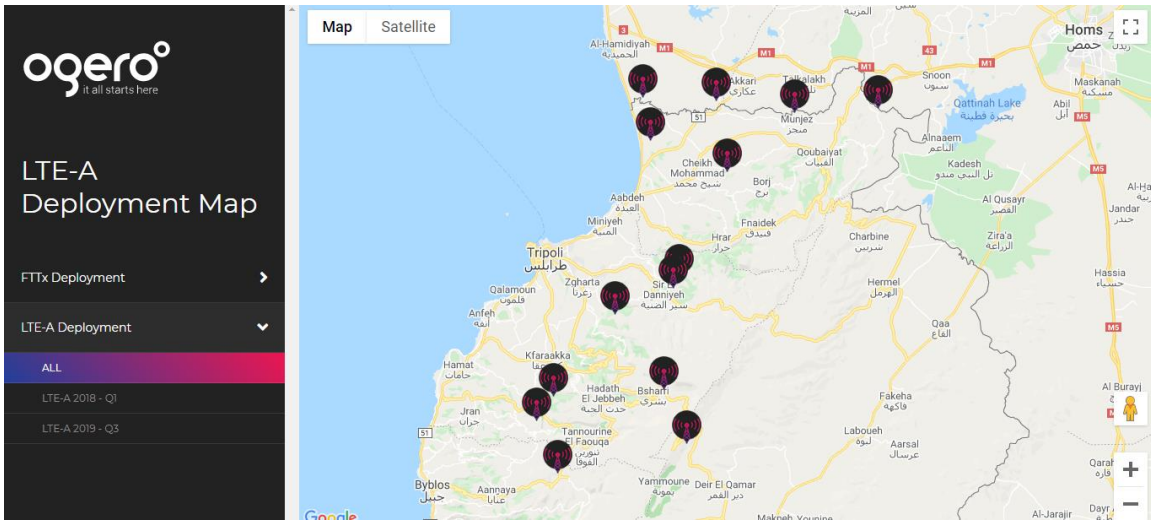
The situation at launch 1/7/2014
31% of inhabited areas are covered by 4G network



TOUCH

After implementation
99,4 % of inhabited areas are covered by 4G network





3

10. Country profile⁴

10.1. Country Rank

Country Ranks		Country Scores	
LEBANON	LEBANON	LEBANON	LEBANON
2019	2015	2019	2015
63/79	65/79	34/120	29/120

³ <https://www.ogero.gov.lb/Maps/?id=1>

⁴ <https://www.huawei.com/minisite/gci/en/country-profile-lb.html#lb2015>

10.2. Strengths

Lebanon improved its ranking from 66th to 63th in GCI 2019.

Lebanon has performed well in mobile broadband penetration, scoring 7. Both smartphone penetration and mobile broadband affordability have improved. Internet usage and computer usage reached new highs this year. However, Lebanon is still behind in advanced ICT.

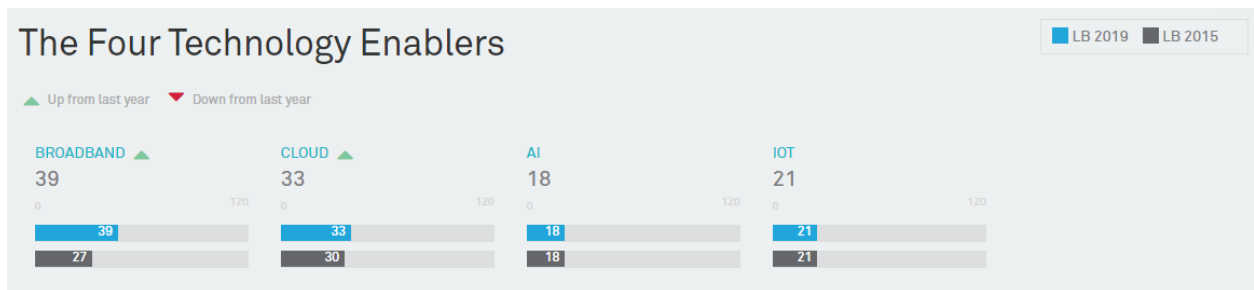
Less than 10% of mobile users in Lebanon are able to use 4G/LTE connections. Moreover, 3G coverage is still poor in several areas. Given that the infrastructure is already in place, Lebanon should focus on installing more new sites and expanding their coverage to all Lebanese territories.

10.3. Opportunities

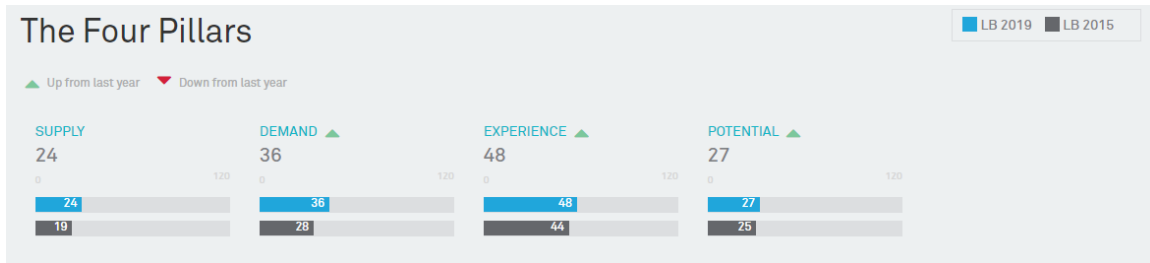
The Lebanon government unveiled the five-year plan Telecom 2020 to revamp Lebanon's telecoms infrastructure and guarantee fiber optic connections for Internet users across the country by 2020.

The first trial of 5G technology in Lebanon demonstrated the capabilities of this advanced technology live on the ground. They achieved impressive results, achieving download speeds of 25 Gbps. The demonstration in a live environment was an important step toward demonstrating the potential of 5G as market ready and to examine how the boundaries of telecommunications can be pushed so that 5G can meet the expectations and needs of its users. 5G technology is expected to deliver better, faster mobile broadband for consumers and enable video everywhere. It will revolutionize lives, economies, and society, and bring us not only changes in mobile communications, but also to lifestyles. It will drive economic enhancement and support a wide range of innovative new services across different industries.

10.4. The Four Technology Enablers



10.5. The four pillars



10.6. The 40 Indicators



IOF: Internet of things

AI: Artificial intelligence

11. Reasons Lebanon's internet is so slow⁵

Though Lebanon has a high international capacity coming in through underwater fiber optic cables — to the likes of several hundreds of megabits per second (Mbit/s) — internet speeds at the actual level of the user are overwhelmingly low. In Beirut, they average about 3.2 Mbit/s according to the Ookla Net Index for household downloads, calculated over a 30-day period ending March 18. This is not considered broadband by modern definitions, and pales in comparison to the global average of 22.3 Mbit/s, calculated over the same time frame.

⁵ <https://www.executive-magazine.com/economics-policy/four-reasons-lebanons-internet-is-so-slow>

But the problem is manifold: getting broadband internet in the country faces layers of obstacles. Here are four of the main reasons why internet speeds in Lebanon are suffering.

11.1. The brand new fiber optic network is not on

Lebanon's newest fiber optic network, by all appearances, is completely switched off. The project was commissioned in 2011 by then Minister of Telecommunications Nicolas Sehnaoui and implemented by local civil works company Consolidated Engineering and Trading (CET) in partnership with international telecommunications company Alcatel–Lucent at a cost of \$55 million.

This network connects the bulk of the central offices (COs) in the country as well as heavy users such as businesses, universities, hospitals, mobile operators and the army, with the newest generation of cables. This network, however, has not yet been approved for further development and use by the new administration under Sehnaoui's successor Boutros Harb — and thus has yet to be switched on. The foggy reason given by advisors to the ministry is that there are mistakes made by contractors that are still in the process of being corrected.

That means we are still relying on older infrastructure to relay data traffic between COs and heavy users, which is mostly made out of copper, save for a small fiber optic loop connecting five COs including Adlieh, Jdeideh and Tripoli. However, according to Maroun Chammas, chair of internet service provider IDM, this network was built to handle Ogero's billing and back office traffic and was never meant to act as the country's backbone for internet traffic. The difference in speeds is quite pronounced. Fiber optic internet can go up to 100 Mbit/s, compared to copper, which is 8 Mbit/s at best, according to Ghassan Hasbani, CEO of consulting firm Graycoats, who adds that the limitations of copper become increasingly problematic the farther the user is from the CO.

11.2. The last mile

Even if the fiber optic backbone was switched on, the average internet user would not feel the difference.

Switching on the new fiber optic network would make a great difference for some of the institutions that make up the economic backbone of our country. And while it is a crucial step, it is only a first step in giving access to broadband to all Lebanese citizens. While the fiber optic network installed by CET and Alcatel–Lucent connected the COs and heavy users, it does not connect the COs to the final leg of the telecommunication network: the average end user. These connections are still made through much slower copper infrastructure.

So even if the fiber optic backbone was switched on, the average internet user would not feel the difference.

But a plan is on the way, we are told. According to advisors Karam and Moussy, Minister of Telecommunications Boutros Harb is currently devising a plan for an FTTX project (fiber to the premises). But the project is still in the planning phase, as it had not yet been determined whether it would bring fiber to the home, to the building or to the curb.

11.3. Bottleneck in the E1 lines

The next reason Lebanon's internet is so slow is not related to infrastructure — or a lack thereof. Rather, a problem that would linger even if the shiny, state of the art fiber optic network was expanded to home users and was turned on, is an apparent obstruction in the distribution of international capacity to the private sector internet service providers (ISPs).

Lebanon does not lack in international capacity. The country's three international exchanges in Beirut, Jdeideh and Tripoli are the gateways for international capacity to reach the country, connecting Lebanon to three underwater fiber optic cables. IMEWE cable connects Lebanon to India and various Middle Eastern destinations, as well as to Western Europe. Meanwhile, the Cadmos cable connects Lebanon to Pentaskhinos in Cyprus and the Berytar cable connects Lebanon to Tartous in Syria.

While Executive has not been able to confirm the exact amount of international capacity the country is receiving with either the ministry or Ogero, the state-run fixed line operator and guardian of the country's telecommunication infrastructure, estimates from consultants and industry leaders peg the capacity at somewhere between 300 and 600 gigabits per second.

But a very small percentage of this is actually passed down to the private sector ISPs. Many internet ISPs have complained of a bottleneck at the level of distribution of international capacity.

Ogero, which also acts as an ISP, is in addition entrusted with leasing access to international capacity through E1 lines on behalf of the government. E1s are the units of capacity — 2.048 Mbit/s each — connecting the client to the CO. Even if there is physical fiber linking the ISP to a CO, the ISP must buy enough E1s to take advantage of faster speeds. While Ogero directly leases internet connections to end users, private sector ISPs buy from Ogero then resell the lines to end users.

Some claims that one of the reasons Ogero is not granting the ISPs E1 lines is because they are reselling them illegally to Alpha, Touch, and illegal ISPs and DSPs.

The outcome of this debacle has been to solidify Ogero's position in the market as a competitor with ISPs. The lack of bandwidth has forced the ISPs to buy capacity from the private sector — such as via satellite. This is more expensive, and makes it harder for the ISPs to compete with the market prices at which Ogero is selling. Ogero has, by the most conservative estimates, over 60 percent of the market for internet service provision.

Moreover, not getting enough E1 lines either prevents the private sector ISPs from expanding their network of customers, or, more likely, forces them to offer slower speeds for each customer as they stretch the maximum amount of people on the same line.

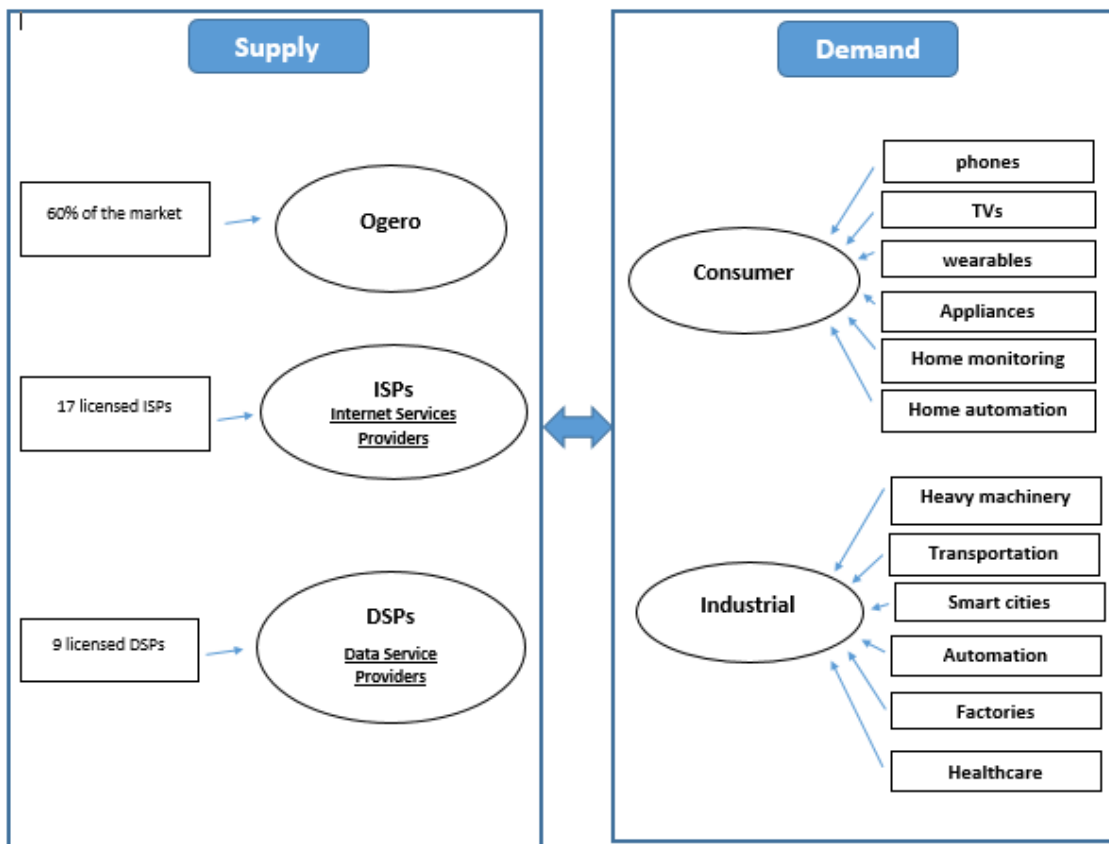
11.4. The high prices

Many ISPs will tell you that if a user wants a faster connection, they can get it — provided they are willing to pay for it. Many businesses in the country have slightly faster internet than in homes, though they often complain about the very high amount they pay for it.

The price of internet service is neither an outcome of market competition or of cost to the providers. Rather, the prices are set by the government and are linked to internet speeds, and every time the government wants to lower the price of the internet, they have to issue a decree. That means a service provider cannot actually lower the price of the internet without a change in the tariffs applied to them.

If internet speeds went up overnight astronomically, then, we would still have to wait for the government to pass a decree to make the faster internet affordable, and in this way Lebanon is still at the mercy of the government.

12. System dynamics



13. Telecommunication Plant

13.1. Inside plant

In telecommunication, the term inside plant has the following meanings:

- All the cabling and equipment installed in a telecommunications facility, including the main distribution frame (MDF) and all the equipment extending inward therefrom, such as PABX or central office equipment, MDF heat coil protectors, and grounding systems.
- In radio and radar systems, all communications-electronics (C-E) equipment that is installed in buildings.

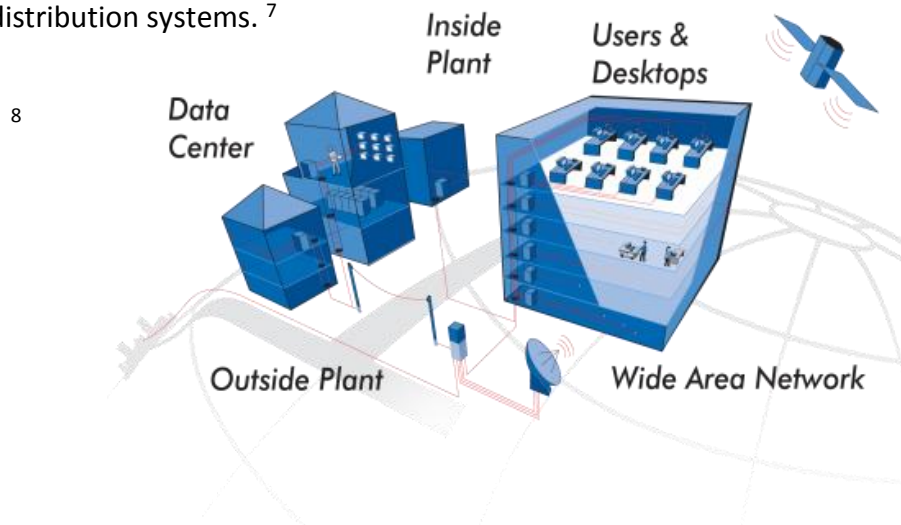
Around the turn of the 21st century, DSLAMs became an important part of telephone company inside plant. Inside plant will also have distribution frames and other equipment including passive optical network (name depends on the Service Provider).⁶

13.2. Outside plant

In telecommunication, the term outside plant has the following meanings:

- In civilian telecommunications, outside plant refers to all of the physical cabling and supporting infrastructure (such as conduit, cabinets, tower or poles), and any associated hardware (such as repeaters) located between a demarcation point in a switching facility and a demarcation point in another switching center or customer premises.
- In the United States, the DOD defines outside plant as the communications equipment located between a main distribution frame (MDF) and a user end instrument.

The CATV industry divides its fixed assets between head end or inside plant, and outside plant. The electrical power industry also uses the term outside plant to refer to electric power distribution systems.⁷



⁶ https://en.wikipedia.org/wiki/Inside_plant

⁷ https://en.wikipedia.org/wiki/Outside_plant

⁸ <https://www.planetirm.com/wp-content/uploads/2014/06/network.png>

14. الخلاصة

- يعتبر قطاع الاتصالات بشكل عام جيدا في لبنان الا ان سرعة الانترنت غير جيدة بالنسبة للأسعار ويعود ذلك لأسباب عدة أهمها:
- البنى التحتية القديمة (مصنوعة من نحاس).
 - عدم تأمين كافة احتياجات الشركات الخاصة بسبب الفساد وذلك لاستحواذ شركة Ogero على النسبة الأكبر من السوق وعدم دعم القطاع الخاص (يقال انها توزع بطريقة غير قانونية لبعض الشركات خاصة).
 - الخطوط fiber التي تم تركيبها لم توضع قيد العمل لأسباب مجهولة.