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FiberConnect Council MENA - Panorama

Middle East and North Africa FTTH & 5G status at December 2021

FiberConnect Council MENA Conference, Dubai May 19th, 2022

Agenda

01 | Study Background

Methodology

- Mission on behalf of the **FiberConnect Council MENA**
- Provide FTTH/B trends in Middle East and North Africa at **December 2021**

ACTIONS

Scope

- Analysis of 17 countries*
- Data per player for FTTH/B and other fibre-based architectures
- Distinction between architecture: FTTH/B vs FTTx (FTTN/C+VDSL, FTTLA+Docsis 3.x)
- Key parameters study: technical, financial, business models, figures

Bottom-up methodology

- Desk research
- Direct contacts with leading players and IDATE partners within countries
- Information exchange with the FiberConnect Council MENA members

Results

- Both quantitative and qualitative data
- Market status in the country
- Strategic approach of involved players

(*) Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates

02 | General overview and main trends

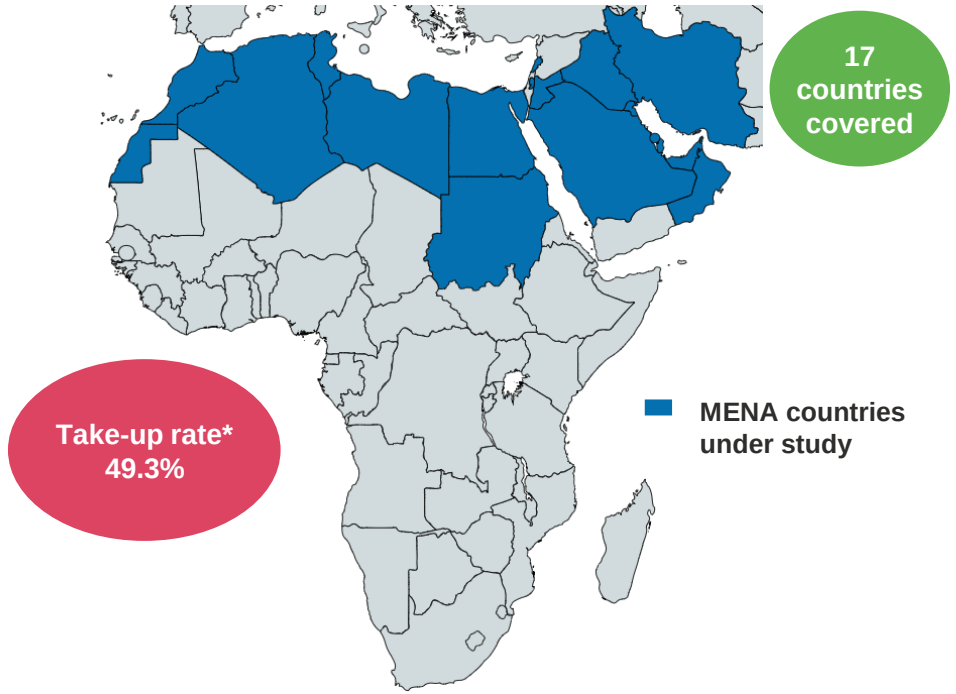
FTTH/B in MENA as at December 2021

Key Figures

MENA-17 detailed figures at December 2021

- **5.2 million FTTH/B Subscribers** (**+ 30% growth** Vs. Sept 2020)
- **11 million FTTH/B Homes Passed** (**+ 26% growth** Vs. Sept 2020)

FiberConnect Council MENA scope at December 2021

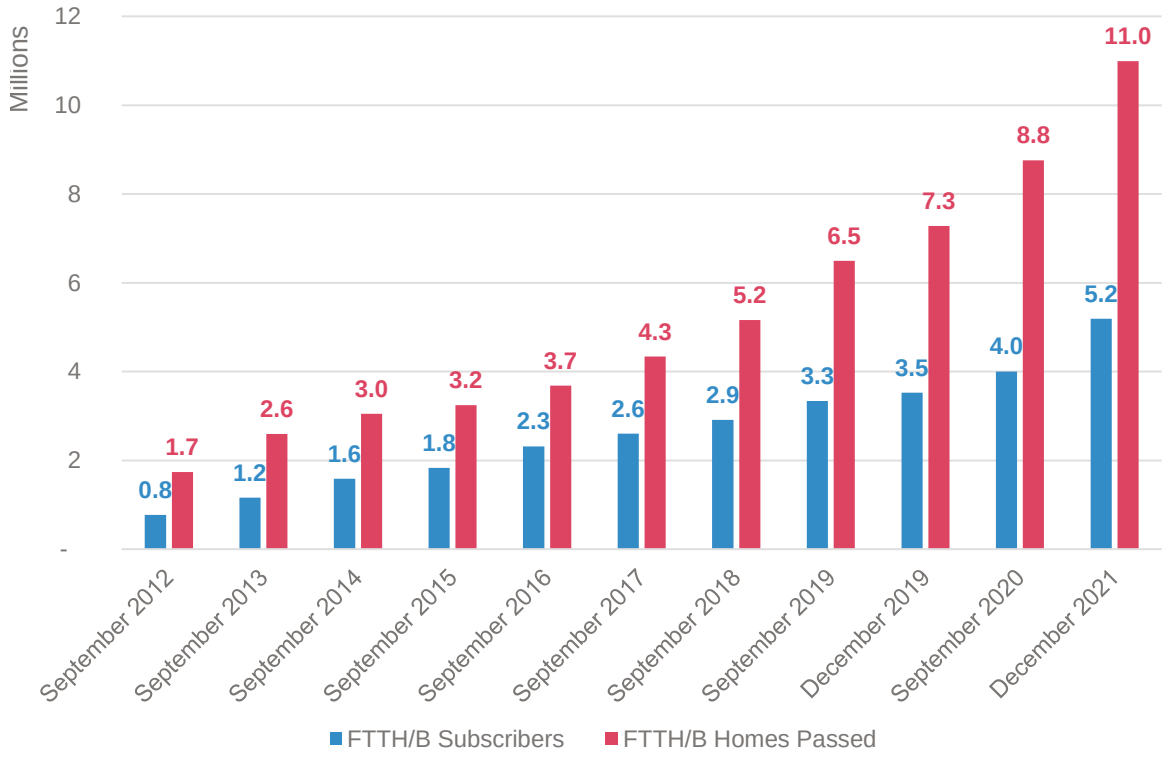


(*) MENA-17 = Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates

Take-up rate = FTTHB Subs / FTTHB Homes Passed

FTTH/B market evolution in MENA (17 countries)

In terms of Homes Passed and Subscribers (Sept. 2012 – Dec. 2021)



Trends from 2012 to 2021

FTTH/B Subscribers x 6.8

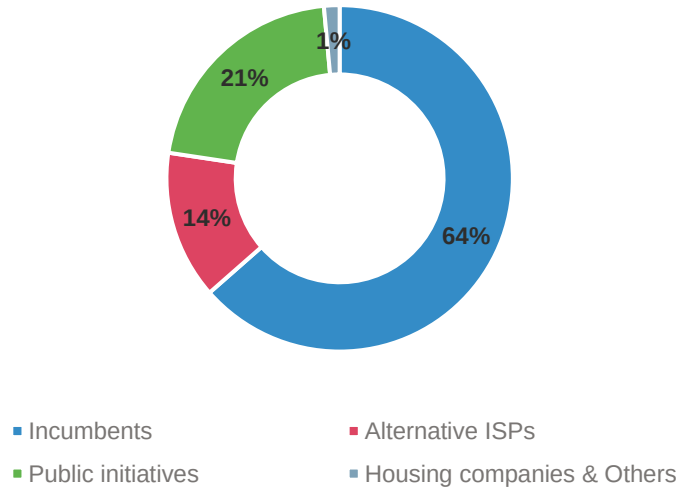
Homes Passed evolution x 6

Source: IDATE for FiberConnect Council MENA

Both public and private actors committed to enhancing FTTH/B networks

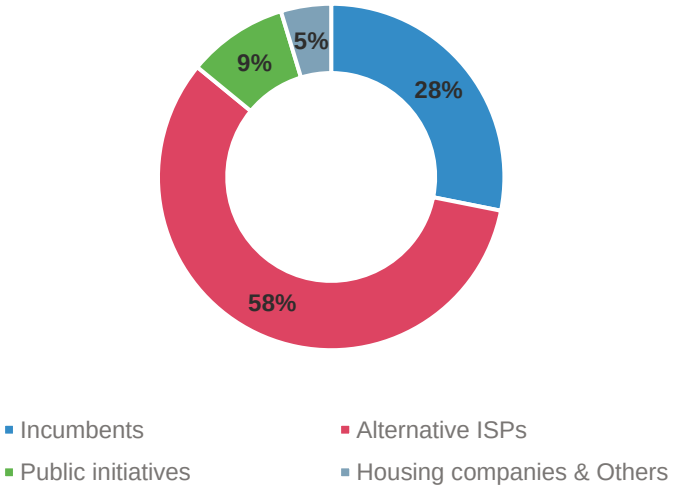
- **60+ initiatives** have been identified and studied in Middle East and North Africa at December 2021.
- **More than half of total Homes** in the region (64%) have been **passed via incumbent's initiatives** (representing 7.4 million homes). **Alternative ISPs** now **cover 14% of total Homes** (1.6 million homes), and **public-driven initiatives** (21%, 2.5 million homes passed).
- **Fibre initiatives** are **mainly led by alternative ISPs** (account for 37 initiatives, i.e. 58%). While these **alternative projects** are not as extensive as **those implemented by incumbents**, they tend to **surpass fibre public initiatives.** Incumbents represent about 28% of fiber initiatives.

Breakdown of FTTH/B Homes Passed deployed by type of player (%)
As at December 2021



Source: IDATE for FiberConnect Council MENA

Breakdown of FTTH/B Initiatives by type of player (%)
As at December 2021



Source: IDATE for FiberConnect Council MENA

03 | MENA : FTTH/B Status and leading countries

FTTH/B in MENA

FTTH/B markets – December 2021

Mature & Dynamic markets


UAE


Qatar


Bahrain


Kuwait


Oman


Saudi Arabia

Markets with significant announcements and/or progress


Algeria


Jordan


Morocco


Tunisia


Egypt


Lebanon


Iraq

High Potential markets


Iran


Libya


Palestine


Sudan

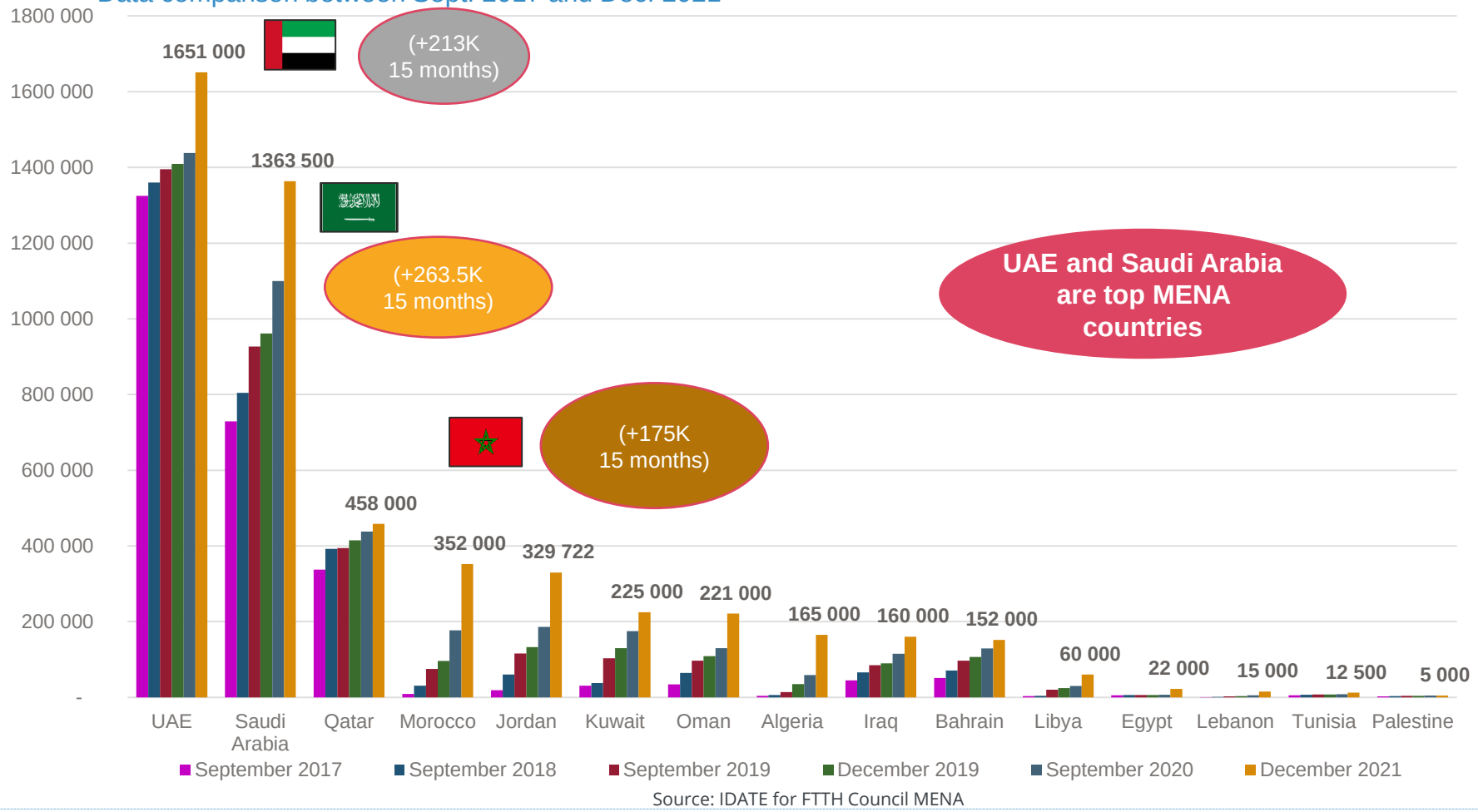
Source: IDATE for FiberConnect Council MENA

General Evolution: FTTH/B Subscribers

Saudi Arabia and United Arab Emirates leading the ranking, accounting for approx. 69% of the total FTTH/B Subscribers in MENA

MENA Ranking* - FTTH/B Subscribers over time (in million homes)

Data comparison between Sept. 2017 and Dec. 2021 **



Source: IDATE for FTTH Council MENA

Top 5 growth rates – Subscribers (in %)

Data from Sept. 2020 to Dec. 2021

Egypt	+ 219 %	+ 15k
Algeria	+ 180 %	+ 106k
Lebanon	+ 173 %	+ 9.5k
Libya	+ 100 %	+ 30k
Morocco	+ 99 %	+ 175k

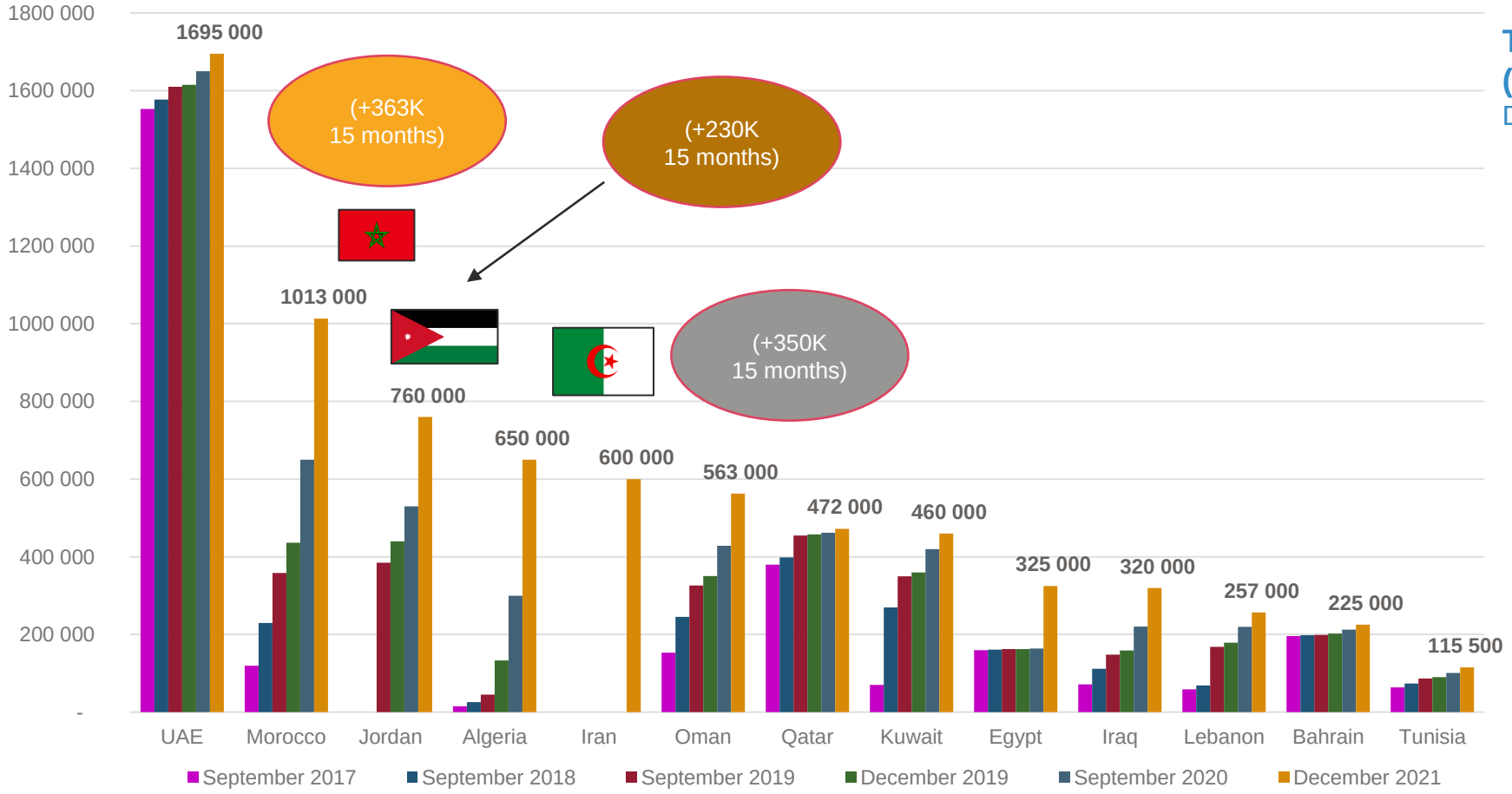
(*) Excluding countries with non available data
(**) Some countries can have partial data

General Evolution: FTTH/B Homes Passed

The Homes Passed ranking also surpassed by Saudi Arabia and United Arab Emirates, both representing 60% of the total FTTH/B Homes Passed in MENA

MENA Ranking* - FTTH/B Homes Passed over time (in million)

Data comparison between Sept. 2017 and Dec. 2021 (**)



Top 5 growth rates – Homes Passed (in %)

Data from Sept. 2020 to Dec. 2021

Algeria	+ 117 %	+ 350k
Egypt	+ 98 %	+ 161k
Morocco	+ 56 %	+ 363 k
Iraq	+ 45 %	+ 100k
Jordan	+ 43 %	+ 230k

Source: IDATE for FiberConnect Council MENA

(*) Excluding countries with non available data
(**) Some countries can have partial data

Trends in MENA : Fibre transformation through the deployment of full FTTH solutions or a progressive migration from copper towards fibre

United Arab Emirates

- Few years ago, Etisalat and Du engaged in the rapid deployment of FTTH networks across the country.
- As at December 2021, the whole country is almost entirely covered with FTTH networks for both residential and corporate users.

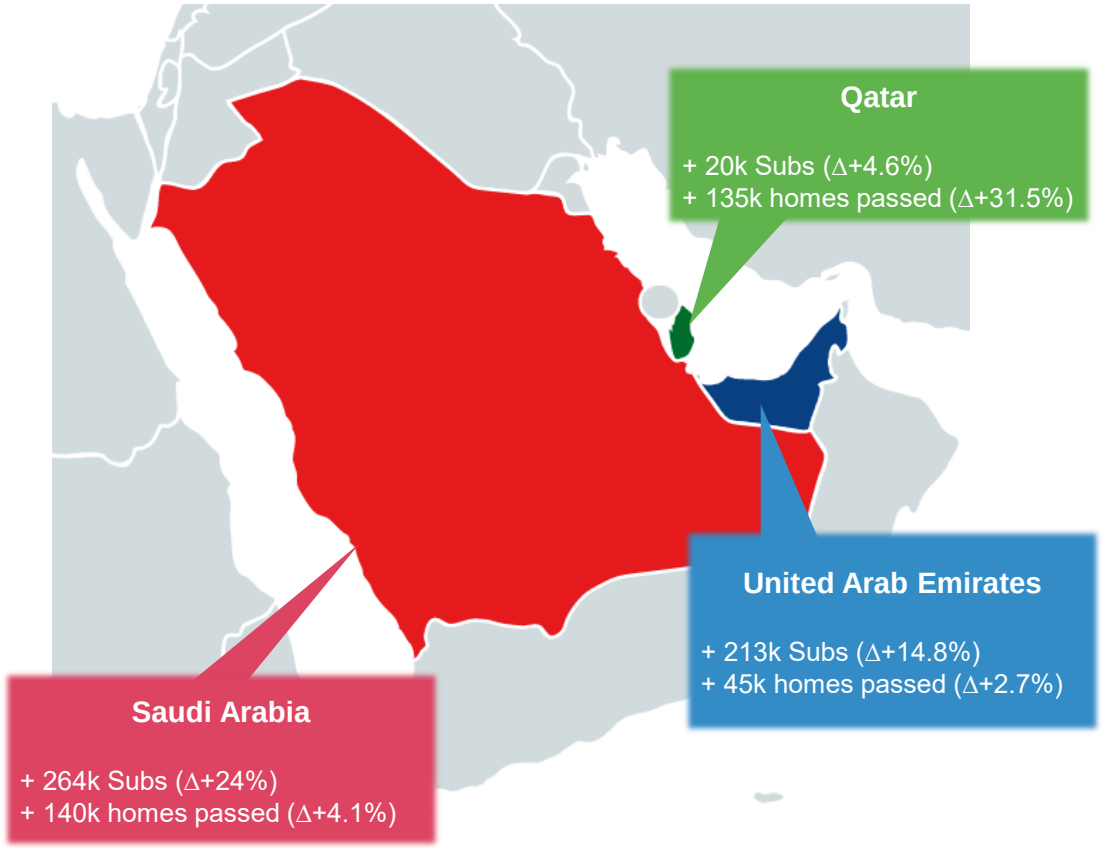
Saudi Arabia

- A country where a National Broadband Plan is currently in execution in order to reach at least 3.5 million homes with FTTH by end 2021.
- Many telecom players are involved in the deployment of the National Broadband Plan and also one electricity company.

Qatar

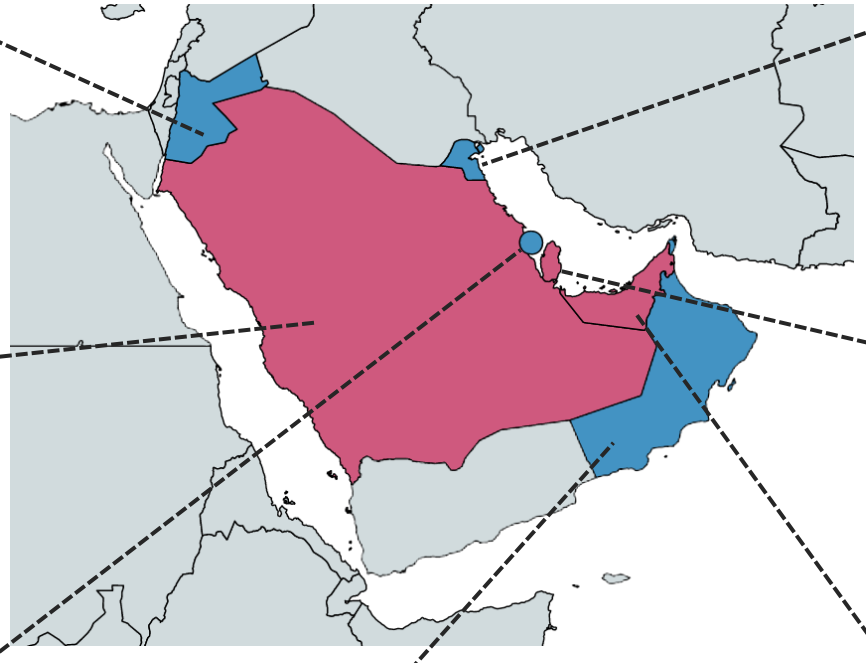
- Qatar's QNBN plays a key role in promoting FTTH deployments throughout the country
- ISPs in Qatar are currently almost covering the whole country with Fiber-to-the-Home broadband networks

FTTH/B additional Subscribers and Homes Passed in United Arab Emirates, Saudi Arabia and Qatar from September 2020 to December 2021



FTTH/B Subscribers in MENA: A region that is represented by 5.2 million FTTH subscribers, led by UAE and followed by Saudi Arabia

FTTH/B Subscribers and Breakdown of FTTx access technologies in the 7 main MENA Fibre markets, December 2021



330k FTTH/B subscribers

Jordan

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

225k FTTH/B subscribers

Kuwait

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

1.36m FTTH/B subscribers

Saudi Arabia

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

458k FTTH/B subscribers

Qatar

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

152k FTTH/B subscribers

Bahrain

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

221k FTTH/B subscribers

Oman

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

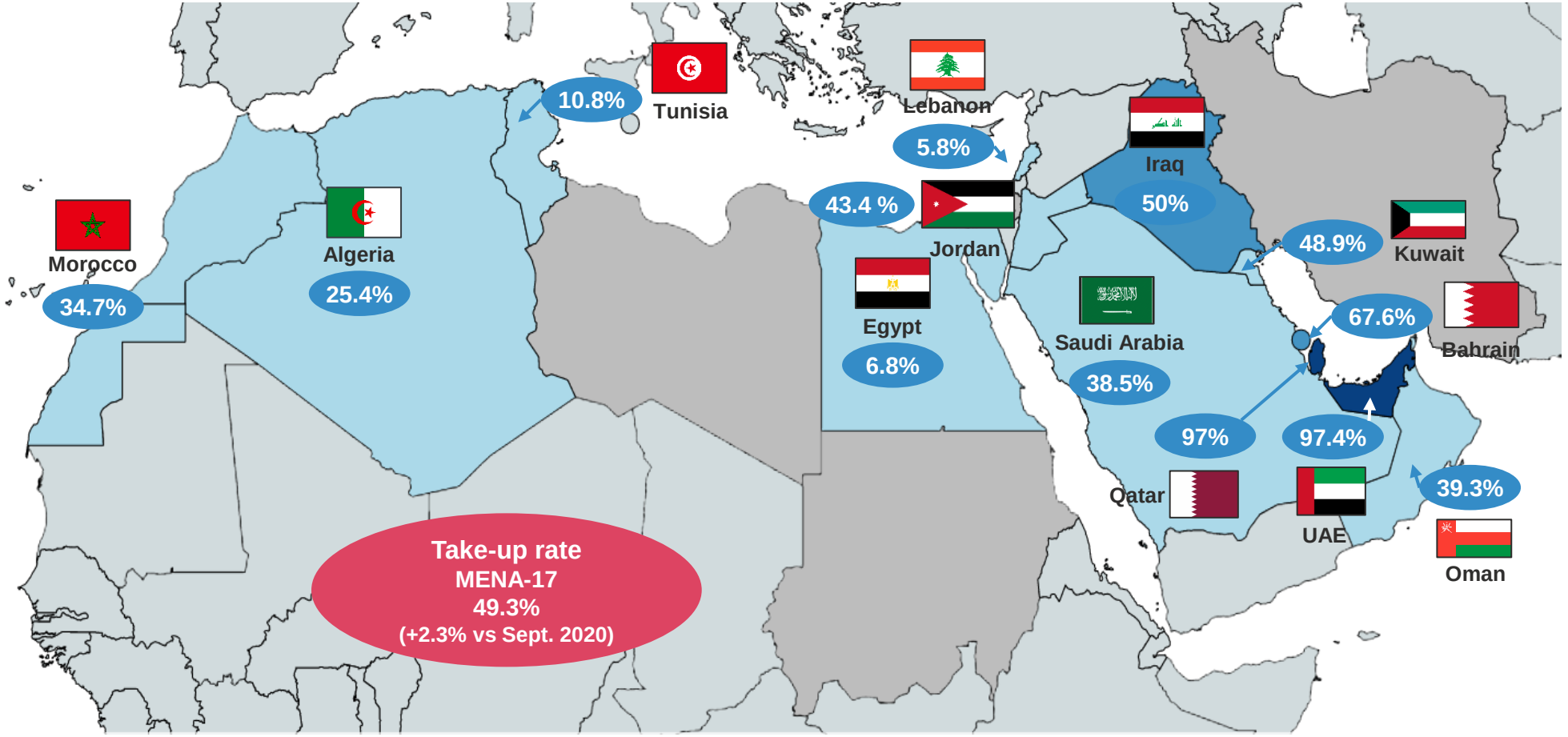
1.65m FTTH/B subscribers

UAE

FTTH / B 100%
FTTx / VDSL 0%
FTTx / Docsis 3.0 0%

Source: IDATE for FiberConnect Council MENA

FTTH/B Take-up rate*: UAE and Qatar as leaders in the region



FTTH/B take-up* as at December 2021

- FTTH/B take-up > 80%
- FTTH/B take-up 40 – 80 %
- FTTH/B take-up < 40 %
- Data not available

*Take-up rate = FTTHB Subs / FTTHB Homes Passed
Some countries can experience a lower take-up rate due to historical data readjustments

Source: IDATE for FiberConnect Council MENA

04 | MENA : FTTH/B Technical trends

Technical evolution of the FTTH/B networks in Middle East and North Africa

How has been the deployment of FTTH/B networks in these countries?

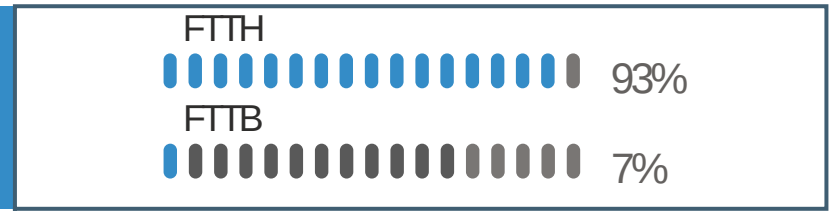
- Methodology: Interviews
- Quantitative variables
- Different variables defined

Focus on upgrading to FTTH/B technology and architecture

Operators rely on PON technology to deploy FTTH solutions

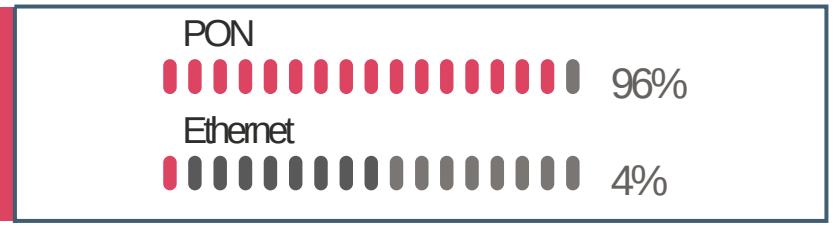
FTTH vs FTTB TECHNOLOGIES

- FTTH remains the key technology used, more especially in countries with high densification of fibre services (UAE, Qatar).
- Many countries in MENA have implemented regulatory rules in order to provide FTTH for each premise nationwide.



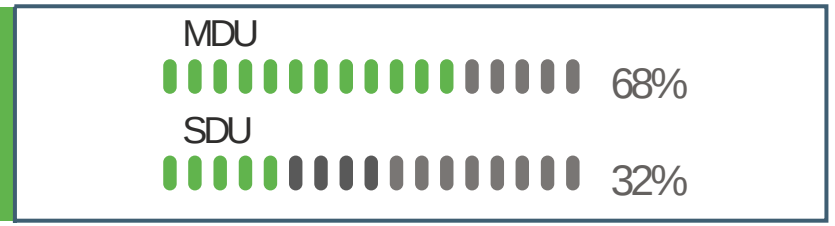
PON vs Ethernet P2P

- Fibre deployment in MENA has been recently implemented and investment efforts are focused on the scalability of the network.
- XGPON is being highly deployed in the region, making P2P Ethernet solutions not so common among MENA countries.



SDU vs MDU

- Historically, FTTH/B has been mainly deployed in green field areas. Nowadays, more and more SDU (i.e. single households) can enjoy FTTH, due to an increasing number of public and private initiatives aiming for full-FTTH nationwide.



Source: IDATE for FiberConnect Council MENA

05 | MENA : FTTH/B Ranking at December 2021

Variables affecting FTTH adoption

Both positive and negative criteria should be considered

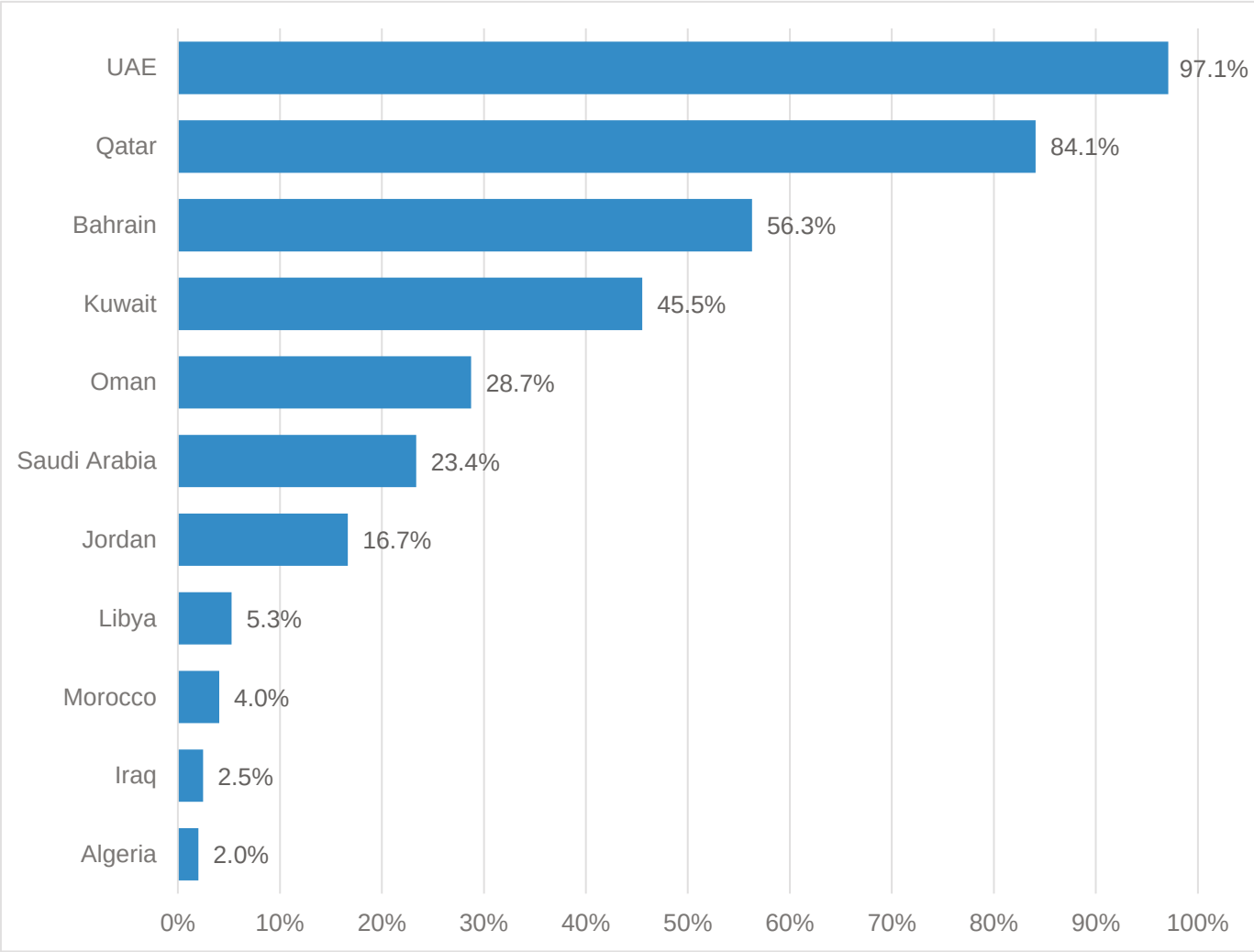
POSITIVE IMPACTS

1. Data demand and bandwidth **has intensified** (due to COVID19 and WFH situations), more operators **focused on full-fibre networks** to sustain ongoing traffic increase
2. Currently **many governments are working closely with incumbents** in the region in order to accelerate fibre deployments and copper migration.
3. Players have found a **new revenue model based on the delivery of high definition services, low latency and add** on services that increase average ARPU
4. Ongoing trend towards **mutualized networks and network sharing agreements** in MENA will accelerate FTTH deployments
5. **Increased private investment** for new and existing network operators.

NEGATIVE IMPACTS

1. **A region with strong presence of wireless connections and copper based networks**, that could satisfy current data demands for a huge population.
2. **5G technology** used in high spectrum bands (26 GHz) **can directly challenge FTTH** in the fixed residential market
3. New variants or mixed-build architectures, **FTTC or DOCSIS 3.1, could delay FTTH investments by operators**. These options tends to be economically more feasible in the short term.
4. **Public funding initiatives may not be enough to effectively encourage FTTH growth**, since a lack of coordination between government, incumbents and alternative ISPs
5. **Price has a strong incidence on fiber adoption**. Price remains the main criterion for adoption, compared to quality, robustness or latency.

MENA FTTH/B Ranking as at December 2021



Source: IDATE for FiberConnect Council MENA

Global Ranking in Middle East and North Africa as at December 2021
(FTTH/B Subscriptions / Households)

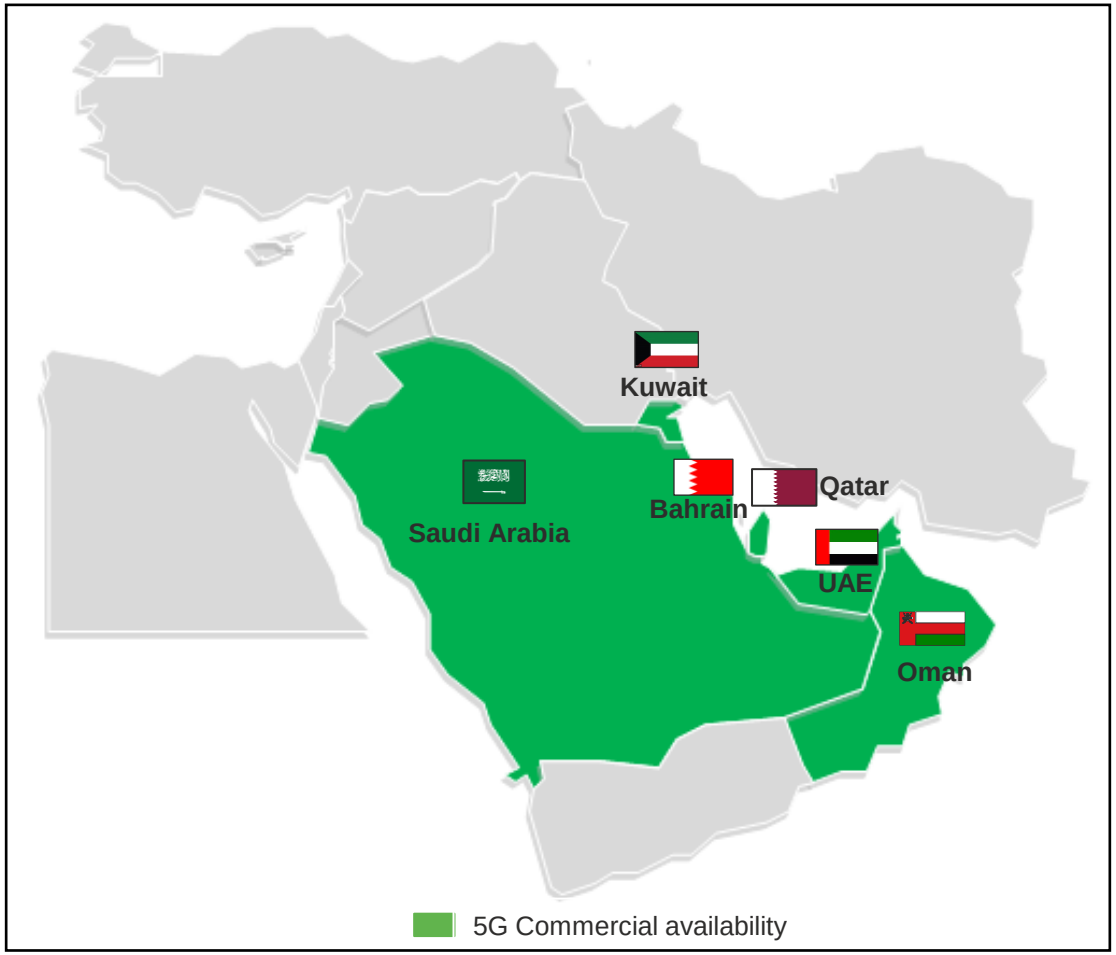
- Includes countries of +200k Households in which FTTH/B subscribers represent at least 1% of total households
- UAE and Qatar as the two main leaders not only in MENA but also Worldwide!
- FTTH enhancement in some MENA countries is still at the early stages, mainly due to a predominance of copper-based technologies

06 | 5G Status in MENA

The Middle East is a diverse region in terms of mobile market maturity

- The Middle East is a diverse region in terms of mobile internet adoption and 5G timelines. **Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE have become 5G pioneers** with governments and regulators awarding spectrum and mobile operators deploying some of the world's first 5G networks.
- **The launch of 5G mobile services in the region began in 2019**, when the first 5G smartphones were commercially available. Some operators launched limited 5G FWA in 2018. For example, UAE successfully trialled FWA in 2018 and launch 5G mobile commercial services in June 2019.
- **Several countries** (Algeria, Egypt, Jordan, Lebanon, Morocco, Tunisia) **started to identify suitable 5G** spectrum and clearing it. **But other countries** like Iraq, Jordan, Libya and Sudan **have not yet announced plans for 5G adoption.**
- **LTE networks will continue to be built**, providing much needed coverage and capacity. Enhanced mobile broadband will be the key use case in early 5G deployments in the MENA region, while applications and services for enterprises are tested.
- **Major 5G capex is expected between 2020 and 2025** as customer adoption increase and demand for enterprises use cases develops.
- **Most mobile operators in the region are planning non standalone network architecture.** Nevertheless, standalone architecture will be introduced in some specific areas where traffic is increasing.

5G commercial availability in the Middle East



Source: IDATE for FiberConnect Council MENA

Middle Eastern operators: among the first to announce 5G network deployments (1/2)

5G commercial launches in MENA

	Operator	Service	Launch date	Coverage and comments	5G subscriptions Dec-21
Bahrain	Batelco	Mobile	June 2019	May-21: 99% of the population	140k
	Viva	Mobile	June 2019	May-21: 95% of the population	90k
		FWA	June 2019	Dec-2021: 70% of the population	
	Zain	Mobile	June 2020	Parts of main populated areas	140k
Kuwait	Viva	Mobile and FWA	June 2019	Dec-21: more than 90% of the population; Sep-19: >1,000 BTS	510k
	Zain	Mobile and FWA	June 2019	Dec-21: About 99% of the population and 2,738 BTS.	700k
	Ooredoo	Mobile & FWA	June 2019	Dec-21: more than 90% of the population.	500k
Oman	Omantel	FWA	December 2019	Sep-21: >500 sites in main towns and cities of all eleven governorates	170k
		Mobile	February 2021	Sep-21: main towns and cities of all eleven governorates	
	Ooredoo	FWA	May 2020	Sep-21: main towns and cities, incl. Muscat, Barka, Sohar, Salalah, Al Buraimi and Nizwa	150k
		Mobile	April 2021	Sep-21: main towns and cities	

Source: IDATE for FiberConnect Council MENA

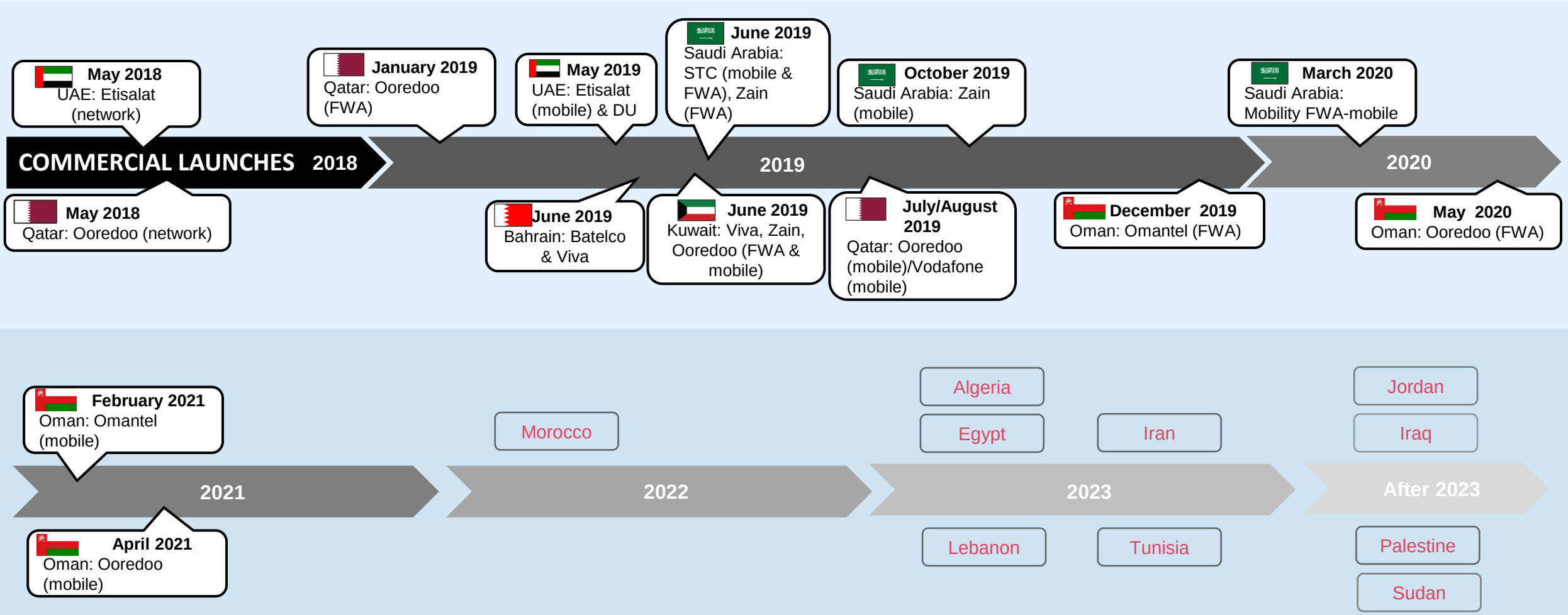
Middle Eastern operators: among the first to announce 5G network deployments (2/2)

5G commercial launches in MENA

	Operator	Service	Launch date	Coverage and comments	5G subscriptions Dec-21
Qatar	Ooredoo	Mobile	May 2018 (Network) July 2019 (5G devices commercially available)	Dec. 21: 'More than 95% of the population.	1M
		FWA	January 2019	Dec-21: Doha	
	Vodafone	Mobile	August 2019	Dec.21: >80 % of the population	550k
		FWA	January 2019	Dec.21: >80 % of the population	
UAE	Etisalat	Mobile	May 2019	Reached 90% of the population by the end of 2021.	460k
		FWA	May 2018	Launched FWA 5G in selected areas Sep-18	
	DU	Mobile	June 2019	Reached 90% of the population by the end of 2021.	240k
Saudi Arabia	STC	Mobile	June 2019	Oct. 21: main cities/towns via 3,500 sites; about 40% of the population	1,8M
		FWA	June 2019	Same cities as mobile services	
	Zain	Mobile	October 2019	Oct. 2021: 51 cities with more than 4600 sites and 62% of the population covered.	1,15M
		FWA	June 2019	Oct. 21: 51 cities	
	Mobility	FWA	March 2020	54 cities	1M
		Mobile	Q1 2020	54 cities and 3 700 sites by October 2021.	

Source: IDATE for FiberConnect Council MENA

Timeline - 5G commercial launches in MENA



Source: IDATE for FiberConnect Council MENA

5G Spectrum and assignments

> 5G licences awarded in five countries since mid-2018

- **Regulators made available Spectrum for 5G services in Bahrain, Kuwait, Oman, Qatar, and Saudi Arabia.** In UAE the 3.4-3.6 GHz band was identified as prime 5G band in 2018.
- **Still, a significant number of countries** (Algeria, Egypt, Jordan, Lebanon, Morocco, Tunisia) **have started to identify suitable 5G spectrum** and the most effective ways of clearing spectrum which will feed into any technical restrictions and associated technical licence obligations.

> The C-band: the most used 5G band

- 3.5 GHz spectrum band awarded in, Kuwait, Qatar, (Vodafone and Ooredoo with 100 MHz each), Oman (Omantel and Ooredoo with 100 MHz each), Saudi Arabia, and UAE (Etisalat and Du with 100 MHz each).
- Egypt: NTRA is formally considering using 3400–4200 MHz for IMT. Algeria, Morocco and Iraq are also considering using Spectrum in the C-band.

5G Spectrum allocations in MENA

	Details	Auction/award date
Algeria	**Planned assignment:** 3400-3800 MHz	n/a
Bahrain	**Assigned:** 800 MHz & 2600 MHz	July 2019
Egypt	**Planned:** 3.4-4.2 GHz **Considering:** 3.8-4.2 GHz	n/a n/a
Iraq	**Planned assignment:** 3.4-3.8 GHz	n/a
Kuwait	**Assigned:** 3.5 GHz	May 2019
Morocco	**Planned assignment:** 3.4-3.8 GHz	n/a
Oman	**Assigned:** 3.4-3.6 GHz & 3.6-3.8 GHz (reserved for a new entrant).	December 2018
Qatar	**Assigned:** 3.5-3.8 GHz **Considering:** 3.4-3.5 GHz & 26.5-27.5 GHz	January 2019
Saudi Arabia	**Assigned:** 700, 800 & 1800 MHz **Assigned:** 2300 & 2600 MHz **Assigned:** 3.5 GHz **Planned assignment:** 26 GHz	2018 January 2019 March 2019 n/a
Sudan	**Planned assignment:** 700 MHz	n/a
Tunisia	Planned assignment: 700 MHz, 3.3-3.6 GHz	n/a
UAE	**Assigned:** 3.3-3.8 GHz **Assigned:** 2600 MHz **Planned:** 26 GHz	2018 H2 2022

Source: IDATE for FiberConnect Council MENA

Main verticals targets in the MENA region

Water Management and Agriculture

Sensors with wireless connectivity for crop fields can help optimize growing and minimize use of water and fertilizers through more targeted application.

Smart Cities and Society

Specialists are not available in many hospitals and could join a local surgeon remotely to perform procedures which require expert skills.

Smart Transportation Systems

Self-driving cars require very aggressive latency (fast response time) while they do not require fast data rates. Could reduce fatalities on the roads.

e-health

Specialists are not available in many hospitals and could join a local surgeon remotely to perform procedures which require expert skills.

Smart Learning

Augmented Reality, Virtual Reality and Virtual Presence will mean that students enter the classroom and bring new ways of learning to students.

Oil and Gas Industry

Analytics to survey land , optimizing well and field work, equipment maintenance and remote performance.

STC is collaborating with Saudi Aramco and Huawei to develop 5G use cases for the oil and gas sector and to explore use cases around MEC, 5G slicing and industrial-scale IoT.

07 | FTTH/B Panorama in MENA

Key conclusions

Key conclusions

1

FIBRE SEEN AS A KEY PRIORITY POST-COVID

- The physical limitation of existing cable and copper networks in terms of bandwidth is pushing telecom players to deploy full fibre solutions. In addition, COVID-19 pushed traffic demand in the region and operators are considering to move their networks to Full Fibre in order to be ready for new traffic peaks.
- In addition, an increasing demand for robust broadband services coupled with strong government incentives to deploy FTTH nationwide will see historical copper-based countries migrate towards full-fibre solutions in the next periods
- More and more public-based initiatives are now intensifying their efforts towards full-fibre connectivity in their home countries (Oman, Qatar, Kuwait, etc.)
- In several historically copper- and cable-based countries, the fixed broadband market is evolving. In these countries, alternative ISPs are involved in FTTH deployments in areas not covered by major national players. However, recent initiatives from incumbents to migrate their core architecture towards FTTH will drive full-fibre rollouts in the next periods.
- Increasing data demand and new usages will encourage players to migrate and embark into FTTH solutions, capable of delivering multi-gigabit throughputs and keep economies alive in times of crises.

2

EMERGING TECH

- Governments are allocating public funds in order to support fibre deployment to deliver FTTH services but also as a back up for 5G networks.
- **5G implications:** 5G will be a key factor for the promotion of fibre deployments and therefore will boost investments from public and private players
- **Wireless Solutions:** One key challenge faced by fibre players is the presence of wireless technologies offering services for an affordable price and with a bandwidth that is accepted by many users.

08 | FTTH/B Global Ranking

Global Ranking

FTTH/B Markets - September 2021 – Countries with more than 25% penetration