White Paper

Wi-Fi for Saudi Mobile Service Providers

Offloading Mobile Data Traffic to Wi-Fi Can Save Saudi Operators up to US$901 Million

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March 2013



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Demand for Wi-Fi has grown substantially since the early 2000s—appearing first in homes, then in offices, and more recently in public places such as coffee shops and hotels. Today, we are experiencing a revolution in wireless Internet access enabled by Wi-Fi: higher speeds, improved security, and more availability on almost any connected device. Wi-Fi is transforming the way users interact with the Internet—wide availability enables them to stay connected via any Wi-Fi-enabled device.

Global growth in Wi-Fi access points (APs) is significant: International Data Corporation predicts that the number of home APs will reach a quarter-billion by 2014, compared with 154 million in 2011. In addition, the Cisco® Visual Networking Index (VNI) projects that global IP traffic transmitted over Wi-Fi will represent 46 percent of all IP traffic by 2015.[1]

In Saudi Arabia, the mobile subscriber penetration rate reached 181.2 percent of the population in the third quarter of 2012, with 53.1 million mobile subscriptions.[2] Additionally, mobile broadband subscriptions constituted 22 percent of the total mobile market for the same period. In the third quarter of 2012, wireless broadband reached 11.7 million subscriptions, compared with 2.2 million landline broadband subscriptions,[2] an indication that mobile broadband usage rates in Saudi Arabia are on the rise. This growth, however, will create two primary challenges for regional mobile operators: 1) ensuring the availability of high-speed packet access (HSPA) and long-term evolution (LTE) spectrum, and 2) securing the required funding for investments in mobile data infrastructure expansion.

Globally, mobile operators are expected to drive Wi-Fi growth through accelerated technology adoption. Because of this, operators in the Middle East must consider Wi-Fi a key pillar of their broadband strategies. This white paper from the Cisco Internet Business Solutions Group (IBSG) discusses four different Wi-Fi business models in use today—in particular, "mobile data offload"—that can enable mobile operators to maximize the benefits of Wi-Fi through cost savings and revenue generation. The paper also shares Cisco IBSG's analysis of the Saudi market to demonstrate the potential financial impact of mobile data offload, and to help operators choose which business models and technologies will support their strategies. In addition, it recommends how mobile operators can reap further benefits from their Wi-Fi investments to be better positioned for offloading mobile data traffic to Wi-Fi.

Wi-Fi Business Models

Mobile operators are interested in Wi-Fi now more than ever because it can help increase revenues and decrease costs. Four business models can help operators provide Wi-Fi to achieve maximum results:

1. **Direct Wi-Fi service to end users:** Provide Internet access to existing users in public places. Wi-Fi service could also be bundled with other offerings to provide additional value.

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2. **Indirect Wi-Fi service through third parties:** Provide Wi-Fi Internet access through third parties such as coffee shops, shopping malls, hotels, and stadiums, with third parties either reselling Wi-Fi access at their locations or providing it for free to their customers. The typical approach for third parties would be to provide complementary Internet service to customers and take advantage of location-based advertising.
3. **Wholesale Wi-Fi service to other mobile operators:** Resell Wi-Fi to other mobile operators who can then provide the service to their customers.
4. **Mobile data offload:** Use the Wi-Fi network to deliver mobile data traffic to mobile broadband users. This approach is highly recommended because it can help mobile operators reduce HSPA and LTE infrastructure costs.

Mobile data offload presents mobile operators in the Middle East a tremendous opportunity to optimize capital and operational expenditures and improve the user experience. Mobile data offload is a viable alternative to serving mobile broadband users in crowded locations such as shopping malls, where spectrum availability for HSPA and LTE mobile access networks is limited. In addition, mobile data offload will give operators the opportunity to reduce data costs, allowing them to accelerate adoption and increase market share.

The challenge for mobile operators, however, will be in quantifying the benefits of mobile data offload and finding answers to a number of questions, including: How much of my HSPA and LTE traffic should be offloaded to Wi-Fi? How much savings in capital expenditures (CapEx) and operating expenses (OpEx) will mobile data offload provide? Which outdoor and indoor locations are best suited for Wi-Fi coverage?

Mobile Data Offload: Financial Impact

The financial savings from mobile data offload could be significant for Saudi mobile operators. Cisco IBSG conducted an in-depth analysis to estimate the financial impact of offloading mobile data traffic from HSPA and LTE to Wi-Fi. Our analysis highlights future demand and usage, estimates infrastructure costs with and without mobile data offload, and shows savings mobile operators can expect under four mobile data traffic offload scenarios: 5 percent, 10 percent, 20 percent, and 30 percent. (Our methodology for analyzing these scenarios is discussed in the Appendix.)

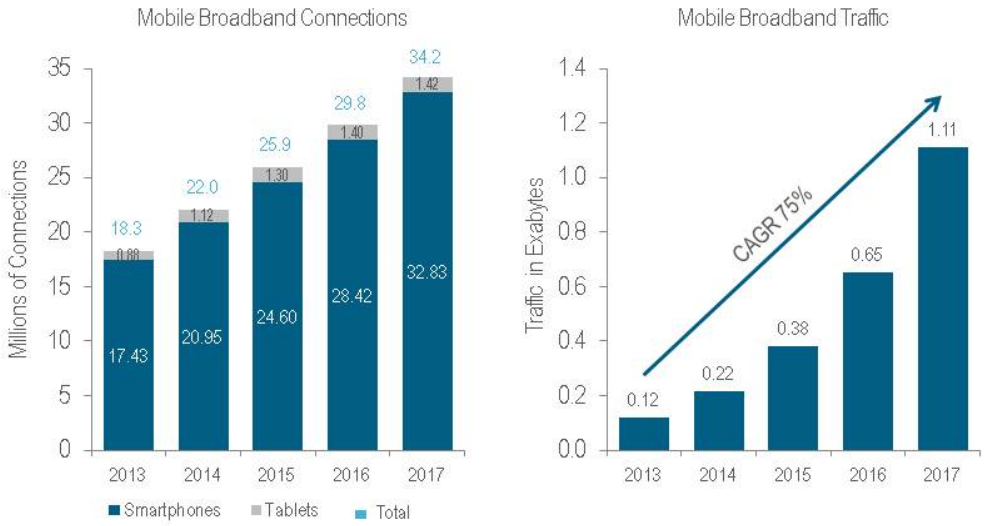
Massively Growing Demand

> Mobile operators are challenged to provide coverage for 1.1 exabytes of mobile data traffic by 2017.

Based on Cisco IBSG's analysis, mobile users in the Saudi market are expected to consume 1.1 exabytes of mobile bandwidth by 2017 due to increased adoption of smartphones and tablets. According to Arab Advisors Group, the number of mobile broadband accounts in Saudi Arabia is expected to exceed 28 million by 2016.[3] Machina Research projected the number of 3G and 4G tablets to reach 1.42 million by 2017[4] (see Figure 1).

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Figure 1. Relationship Between Global Growth in Mobile Broadband Connections and Traffic.



Sources: Arab Advisors Group and Machina Research

Mobile operators must invest in HSPA and LTE networks to address this growth. Offloading mobile data from HSPA and LTE to Wi-Fi networks is an attractive concept to mobile operators, but realizing it depends highly on their technical and strategic abilities.

Heavy Investment Required To Build HSPA and LTE Infrastructures

Without offloading mobile data traffic, mobile operators will need to invest up to $3.318 million in HSPA and LTE networks by 2017.

Cisco IBSG's analysis shows that mobile operators will need to invest up to $3.318 million in HSPA and LTE infrastructures by 2017 to meet the growing demand for mobile data. Costs will vary depending on mobile data traffic offload rates, which typically are determined by an operator's ability to move mobile data traffic to a Wi-Fi network, at least in congested locations.

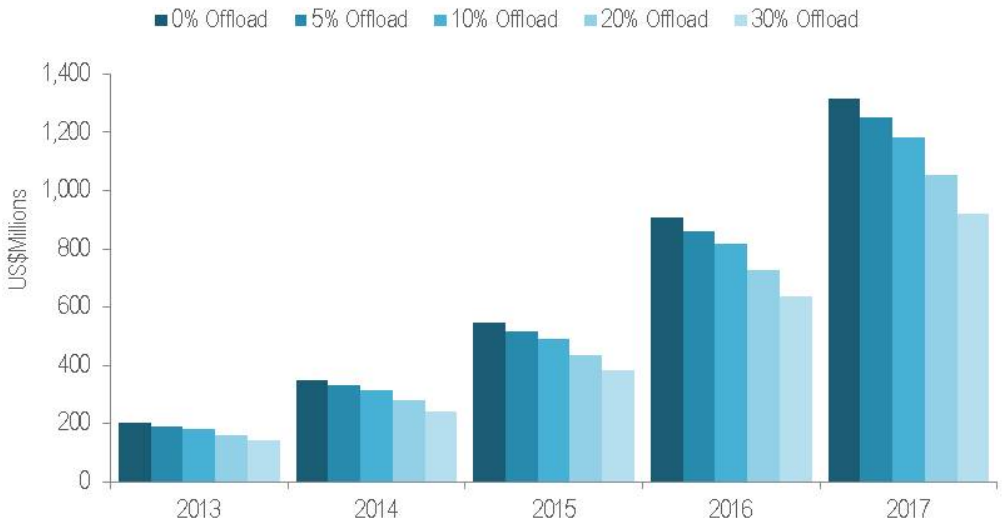
Cisco IBSG calculated cost reductions operators can expect between 2013 and 2017 under four offloading schemes:

- 30 percent: cost will be reduced to $2.323 million
- 20 percent: cost will be reduced to $2.655 million
- 10 percent: cost will be reduced to $2.986 million
- 5 percent: cost will be reduced to $3.152 million

Figure 2 compares these savings and the costs of not offloading data from HSPA and LTE to Wi-Fi networks.

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Figure 2. HSPA and LTE Infrastructure Costs over Five Years.



Source: Cisco IBSG, 2013

Additional Investment Required To Provide Wi-Fi Coverage

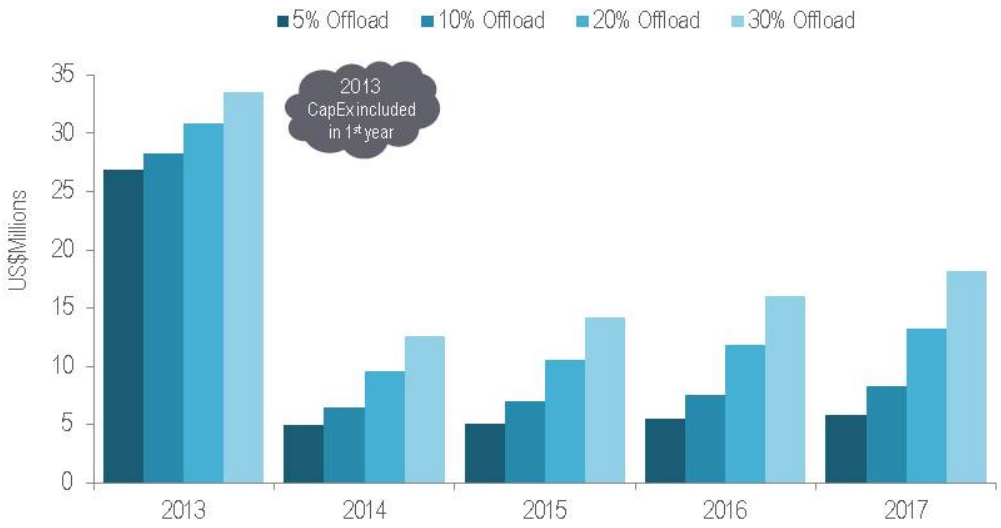
Careful selection of indoor and outdoor Wi-Fi locations will help operators maximize the use of mobile data traffic offload.

Offloading data traffic to Wi-Fi requires significant investment. Based on its analysis, Cisco IBSG determined that Saudi mobile operators would have to invest $94.6 million between 2013 and 2017 to provide Wi-Fi coverage to 725 buildings with total indoor space of 7 square kilometers and total outdoor space of 69 square kilometers for busy locations across Riyadh, Jeddah, Dammam, and Khobar. Of this investment, 30 percent would be allocated to CapEx and 70 percent to OpEx.

Costs will be lower if mobile data traffic offload rates are reduced; for example, total estimated costs for each scenario over five years are $94.6 million with 30 percent offload, $76 million with 20 percent offload, $57.5 million with 10 percent offload, and $48.2 million with 5 percent offload (see Figure 3).

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Figure 3. Wi-Fi Infrastructure Costs over Five Years.

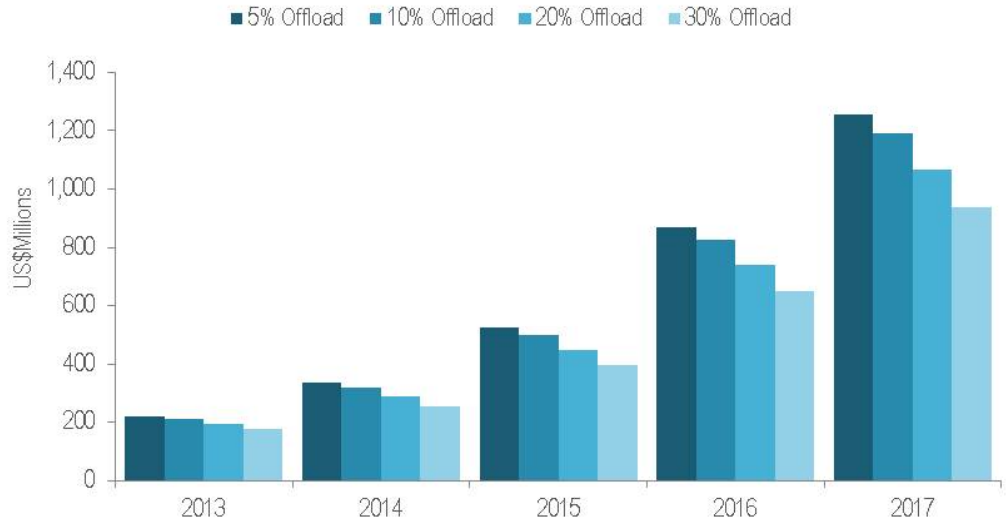


Source: Cisco IBSG, 2013

Combined Cost for Three Mobile Network Components

After determining the rate of mobile data traffic offload, mobile operators will need to add additional Wi-Fi infrastructure costs to the reduced HSPA and LTE infrastructure costs. If mobile data offload is applied, then the overall Wi-Fi, HSPA, and LTE infrastructure costs over five years will be $2.417 million with 30 percent offload, $2.731 million with 20 percent offload, $3.044 million with 10 percent offload, and $3.201 million with 5 percent offload (see Figure 4).

Figure 4. HSPA, LTE, and Wi-Fi Infrastructure Costs over Five Years.



Source: Cisco IBSG, 2013

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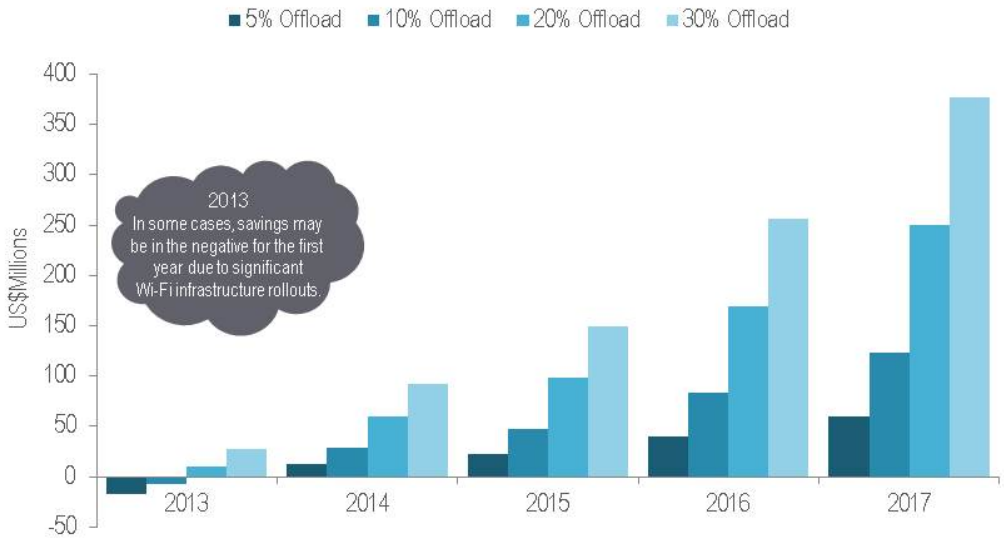
Mobile Data Offload Presents Significant Cost Savings

Offloading 30 percent of the overall traffic will enable mobile operators to reduce costs by 27 percent and obtain savings of up to $901 million in five years.

Mobile operators can expect significant cost savings from offloading mobile data traffic to Wi-Fi; savings will vary depending on the offload rate. From Cisco's experience, both internally and with our customers, mobile operators can offload up to 30 percent of their mobile data traffic. However, some operators may not be able to offload large amounts of data traffic for technical and strategic reasons. Our analysis assumes that mobile operators will offload mobile data traffic at different rates.

If 30 percent of overall traffic is offloaded, operators will save more than $901 million from 2013 to 2017. Savings will be less if the offload rate is reduced. For example, with offload rates of 20 percent and 10 percent, savings will be $587 million and $274 million, respectively. An offload rate of 5 percent will result in savings of $117 million (see Figure 5).

Figure 5. Savings from Mobile Data Offload.



Source: Cisco IBSG, 2013

Leading the Mobile Market Transition

Mobile operators who provide high-quality mobile data services, particularly in a massively growing market, will lead the change in the Saudi mobile industry. To maintain service quality and to support increased usage and faster speeds, operators must create supply alternatives—having only one network will be costly. They must also recognize which network is best suited for which location, device, economic model, and customer need. Based on Cisco IBSG's analysis, Wi-Fi is a viable option for mobile operators. Wi-Fi and other next-generation wireless technologies will enable the new mobile revolution.

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Mobile operators should make Wi-Fi part of their strategies: technical and commercial. Taking steps early on when it comes to mobile data offload will enable operators to compete in such a dynamic marketplace. These key steps serve as a starting point:

- **Develop a granular business case:** Apply a granular analysis of the financial aspects of mobile data offload that includes each operator's perspective on the growth of mobile data traffic and the most suitable locations for Wi-Fi.
- **Conduct Wi-Fi technical evaluations:** Mobile operators must understand the technical implications of their networks to set the base for a new network or expand an existing one. This step will enable them to ensure smooth operations and enhance the user experience.
- **Determine key indoor and outdoor locations:** Analyze and prioritize geographic locations that experience mobile data traffic congestion and identify future locations based on projected demand. By doing this, mobile operators can expand capacity and generate traffic to the newly developed Wi-Fi network.

Wi-Fi opportunities not only will come from mobile data offload—mobile operators can capitalize on additional benefits of Wi-Fi. For example, operators can offer consumers Wi-Fi as a broadband service based on location or as part of a service bundle. To maximize the benefits of Wi-Fi, operators can:

- **Target other local and international mobile operators:** Take a wholesale approach to selling Wi-Fi services to other operators to capitalize on your Wi-Fi network.
- **Explore new ways to make money from Wi-Fi[5]:** Augment typical offload business models with new and innovative Wi-Fi business models such as churn reduction, enhanced retail experiences, managed services, and seamless offers.
- **Incorporate Wi-Fi as part of the services portfolio[6]:** Provide Wi-Fi as a service within your mobile data offering, encouraging customers to use Wi-Fi more frequently on their smartphones and/or on other Wi-Fi-enabled devices.
- **Encourage feedback from your mobile users:** Location-based advertising is a key aspect of the Wi-Fi business model; therefore, mobile operators should conduct surveys on users' willingness to accept advertising over their mobile devices.

Conclusion

Wi-Fi holds great potential for mobile operators, commercially and financially. Global operators have begun to recognize the financial viability of offloading mobile data traffic to Wi-Fi and therefore have started executing on such strategies to reduce costs. In addition to cost savings, mobile data offload presents operators an opportunity to enhance the user experience and overcome future spectrum limitations.

As mentioned in the beginning of this paper, 34.2 million smartphone and tablet broadband connections are projected to consume more than 1.1 exabytes of data in Saudi Arabia by 2017. Mobile operators' investments in HSPA and LTE to serve this demand will be extremely high. A mobile data offload strategy will help operators reduce costs by 27 percent, or $901 million. This savings does not take into consideration other commercial opportunities related to data roaming and wholesaling Wi-Fi to other operators.

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Creating a detailed business model, conducting a network assessment, and selecting the right indoor and outdoor Wi-Fi locations will help operators maximize the benefits of their Wi-Fi investments and ensure the efficiency of mobile data offload over the long term.

Acknowledgements

The author would like to acknowledge Shukri Eid and Marco Nicosia for their contributions to this paper.

For more information, contact:

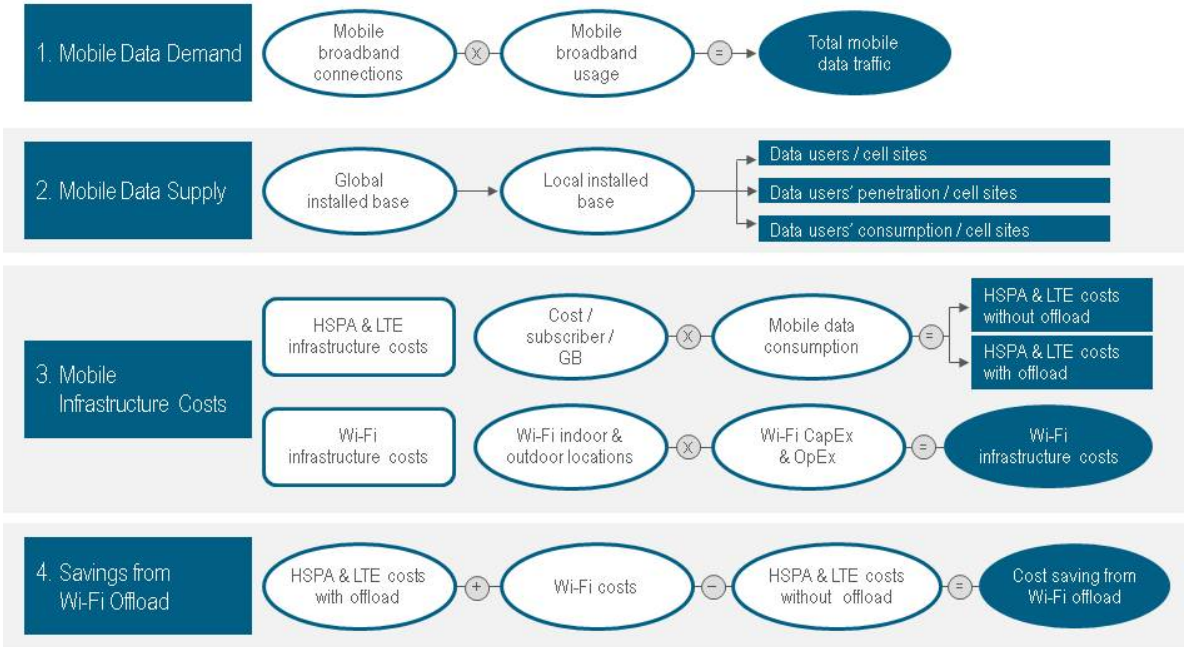
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Appendix: Methodology for Quantifying Mobile Data Offload

To estimate cost savings from mobile data offload, Cisco IBSG took a top-down approach consisting of four primary steps: 1) defining the size of the mobile broadband market; 2) identifying the required mobile infrastructure to serve projected demand; 3) estimating costs to build HSPA, LTE, and Wi-Fi infrastructures; and 4) estimating savings from mobile data offload. Figure 6 outlines our approach. Our analysis also takes into account input from additional market research (see Endnotes).

Figure 6. Approach for Estimating Mobile Data Offload Savings.



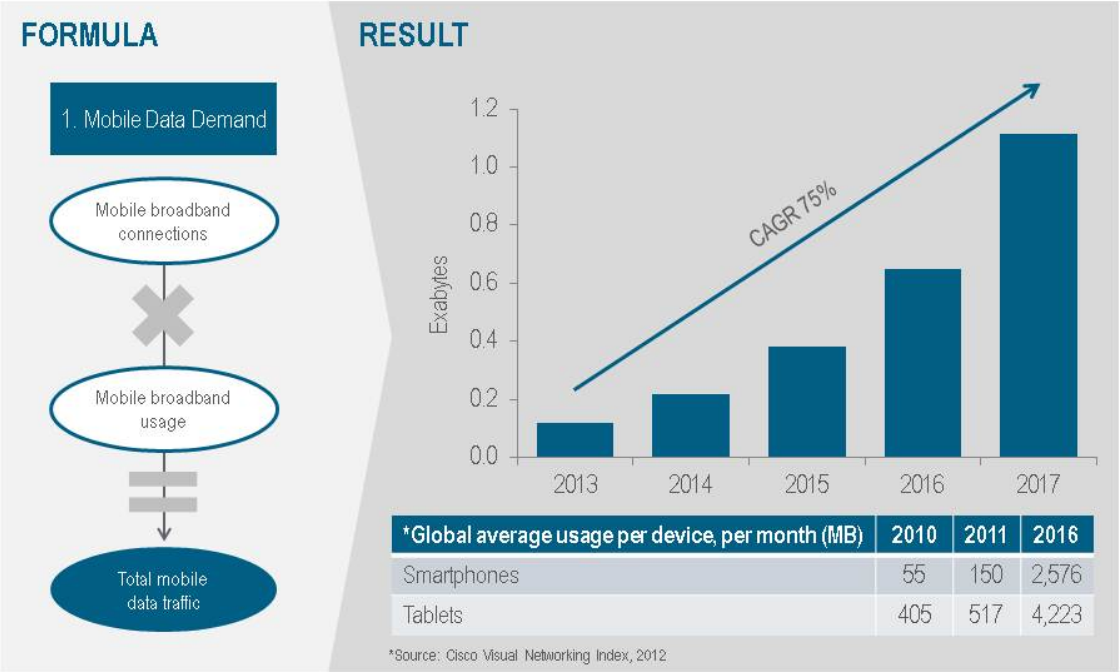
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1. Mobile Data Demand

To simplify our methodology, we split the approach in two: demand side and supply side. By looking at the number of smartphone and tablet users, we were able to identify the size of the mobile broadband market in Saudi Arabia. Estimated demand also took into account average data traffic consumed by these devices, which provided us with an estimate of the total mobile data traffic for the Saudi market. The results showed 75 percent growth in mobile data traffic, reaching a total of 1.1 exabytes by 2017 (see Figure 7).

Figure 7. Growth in Mobile Data Broadband Traffic over Five Years.



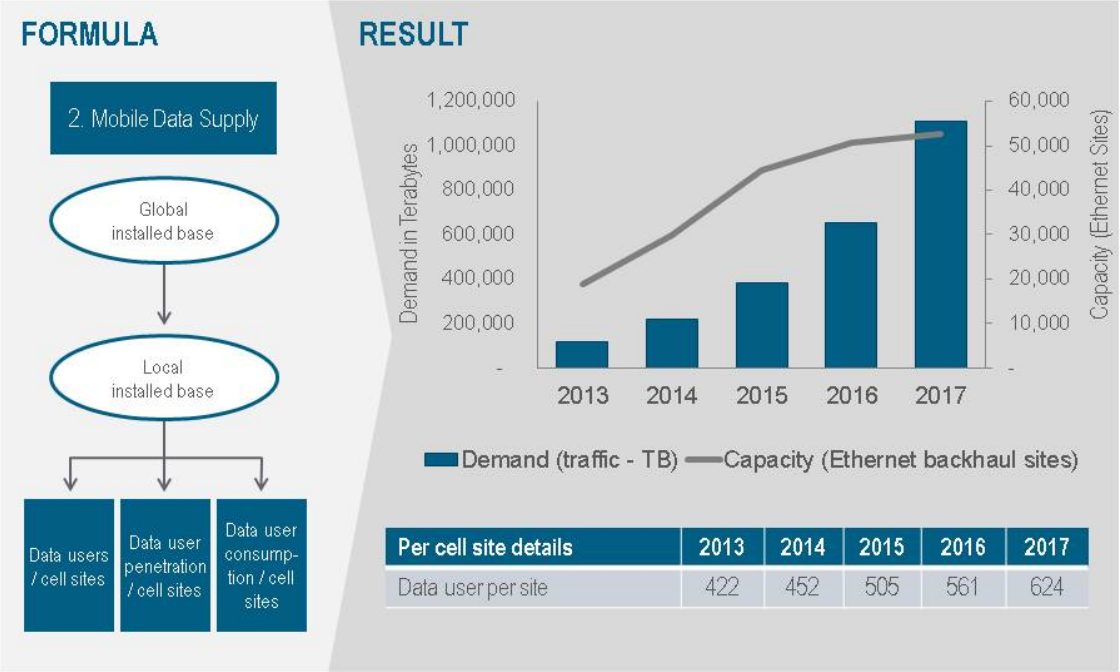
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2. Mobile Data Supply

For the supply side, we estimated that the future HSPA and LTE installed base would be in-line with the predefined mobile data consumption detailed in the Mobile Data Demand section. Our analysis took into consideration the global HSPA and LTE installed base[7] before narrowing it down to the local installed base. The results showed a correlation between mobile data growth and HSPA/LTE capacity, with the expectation that Ethernet backhaul sites will reach nearly 52,000 across Saudi Arabia by 2017 (see Figure 8).

Figure 8. Correlation Between Mobile Data Demand and HSPA/LTE Capacity over Five Years.



Per cell site details	2013	2014	2015	2016	2017
Data user per site	422	452	505	561	624

Source: Cisco IBSG, 2013

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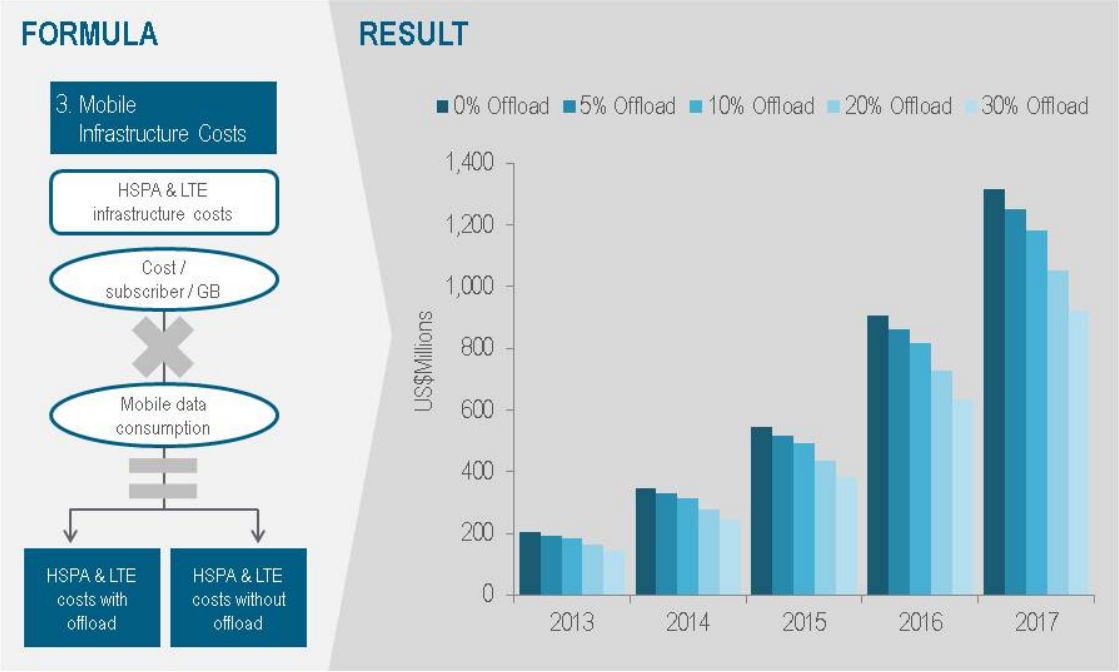
3. Mobile Infrastructure Costs

HSPA and LTE

The third part of our methodology defined the required investments in HSPA and LTE networks; global cost-per-GB was used.[8] HSPA and LTE network infrastructure costs were determined by two main variables: 1) estimated additional Ethernet sites and 2) cost-per-GB for additional mobile data traffic from 2013 to 2017.

This approach gave us insight into additional HSPA and LTE infrastructure required in Saudi Arabia, with four mobile data offload scenarios: 5 percent, 10 percent, 20 percent, and 30 percent. Estimated total HSPA and LTE infrastructure costs for Saudi mobile operators were $3.318 million by 2017 (see Figure 9).

Figure 9. Total HSPA and LTE infrastructure Costs Are Estimated To Reach $3.94 Million by 2017.



Source: Cisco IBSG, 2013

Wi-Fi

Wi-Fi infrastructure costs were determined by the number of indoor and outdoor APs. Indoor locations were estimated by the number of public buildings in Saudi Arabia: our research included 90 shopping malls, 26 airports, five exhibition centers, 105 hospitals, 147 hotels, 64 universities, and 288 large retail outlets with total indoor space of 7 square kilometers. We determined that 725 indoor buildings would be Wi-Fi-enabled, providing coverage to almost 7 square kilometers.

Outdoor coverage of 69 square kilometers was estimated for the most highly populated and commercially busy areas in Saudi Arabia's four largest cities: Riyadh, Jeddah, Khobar, and Dammam. Riyadh is considered the largest city in terms of mobile usage; therefore, the study assumed 36 square kilometers for outdoor Wi-Fi coverage. Due to considerable mobile usage in Jeddah as well, the study assumed 28-plus square kilometers of total

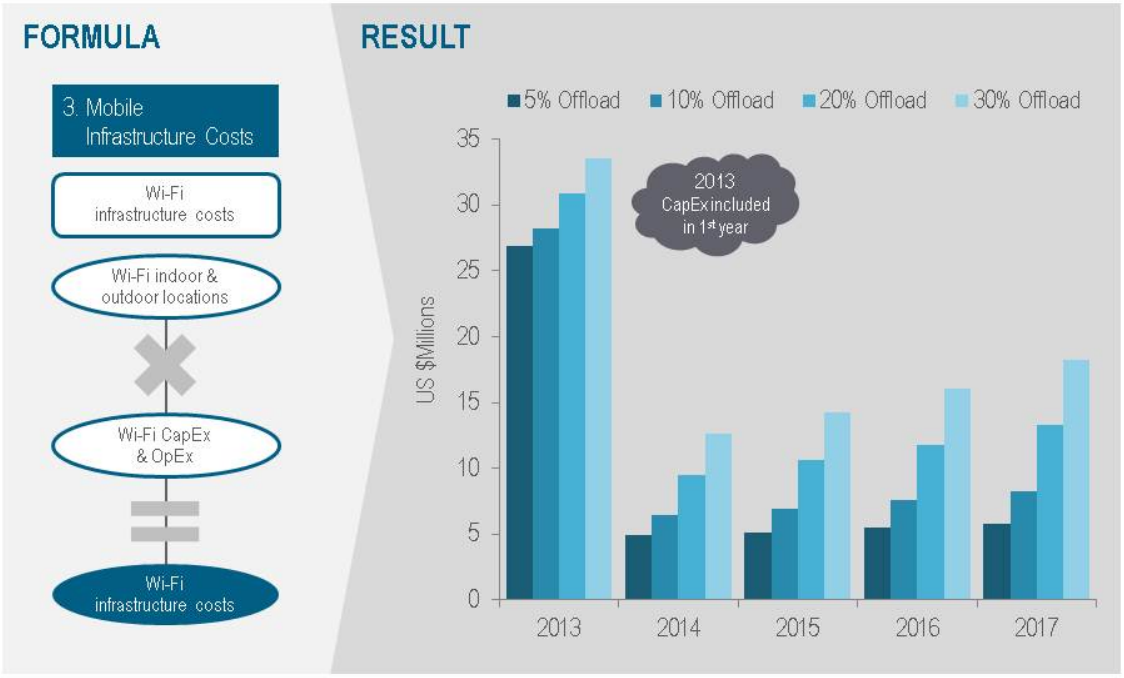
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outdoor Wi-Fi coverage. Considerable Wi-Fi coverage was also considered for Dammam and Khobar: roughly 3,000 square kilometers each.

Estimating indoor and outdoor space enabled us to calculate the required Wi-Fi network costs using Cisco's Service Provider Wi-Fi solutions tool.[9] The tool was programmed to translate Wi-Fi market information into technical requirements first, then into cost requirements for CapEx and OpEx.

Estimated Wi-Fi infrastructure costs were $94.6 million with 30 percent mobile data offload and $48.2 million with 5 percent offload for the period of 2013 to 2017. These figures include CapEx and OpEx, where OpEx will contribute to roughly 75 percent of the total cost. Figure 10 shows the annual cost distribution, taking into account that CapEx is fully covered within the first year (see Figure 10).

Figure 10. Annual Wi-Fi Infrastructure Costs over Five Years.



Source: Cisco IBSG, 2013

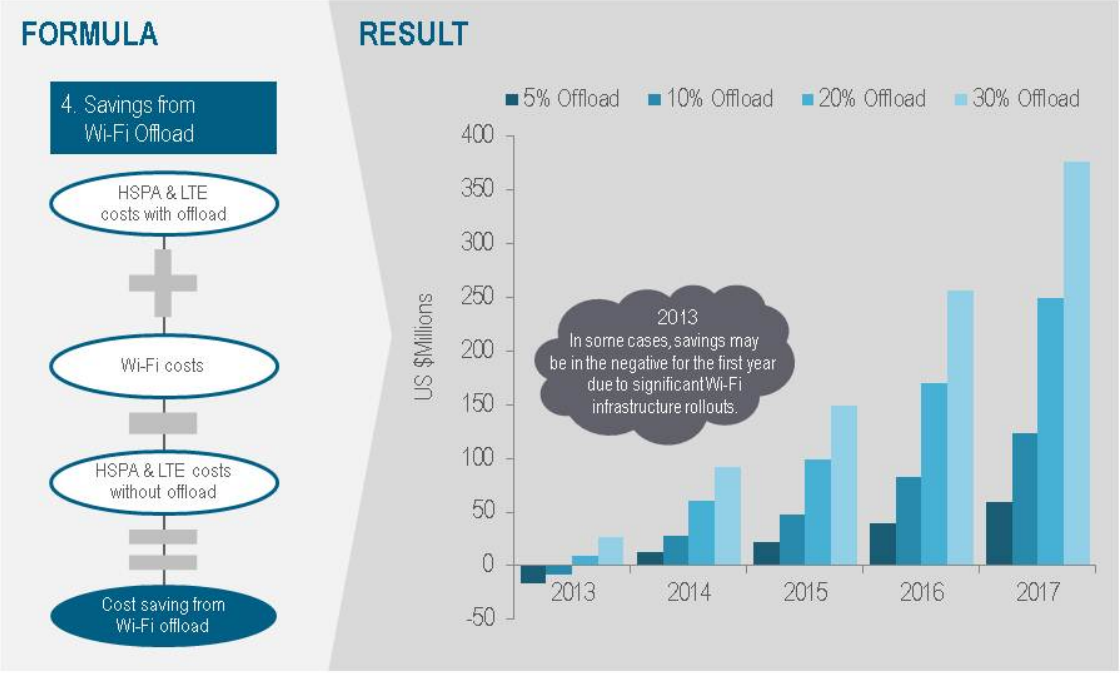
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4. Savings from Mobile Data Offload

We estimated the demand for mobile data and the required supply to secure enough capacity for the rapidly growing mobile broadband market in Saudi Arabia. We then calculated associated costs for HSPA, LTE, and Wi-Fi infrastructure, taking into account the four mobile data offload scenarios. This approach allowed us to analyze potential savings mobile operators could realize by offloading HSPA and LTE traffic to Wi-Fi

Each offload scenario revealed potential savings. The 30 percent scenario showed that Saudi mobile operators could save up to $901 million by 2017 (see Figure 11).

Figure 11. Mobile Operators' Savings from Traffic Offload over Five Years.



Source: Cisco IBSG, 2013

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Endnotes

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