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Experiences from smart fixed wireless access deployment

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Fixed wireless access (FWA) service deployment in a 4G (LTE) network can pave the way for a successful 5G FWA market introduction.

Based on LTE technology – currently capable of providing downlink peak rates of over 1 gigabit per second – FWA offerings have been on the market for several years, from many communications service providers worldwide. With 5G due to provide 10 to 100 times more capacity and higher data throughput rates than 4G, it has the potential to enable cost-efficient FWA solutions on an even larger scale. 4G and 5G FWA solutions are complementary, and can be used to address requirements of different customer segments.

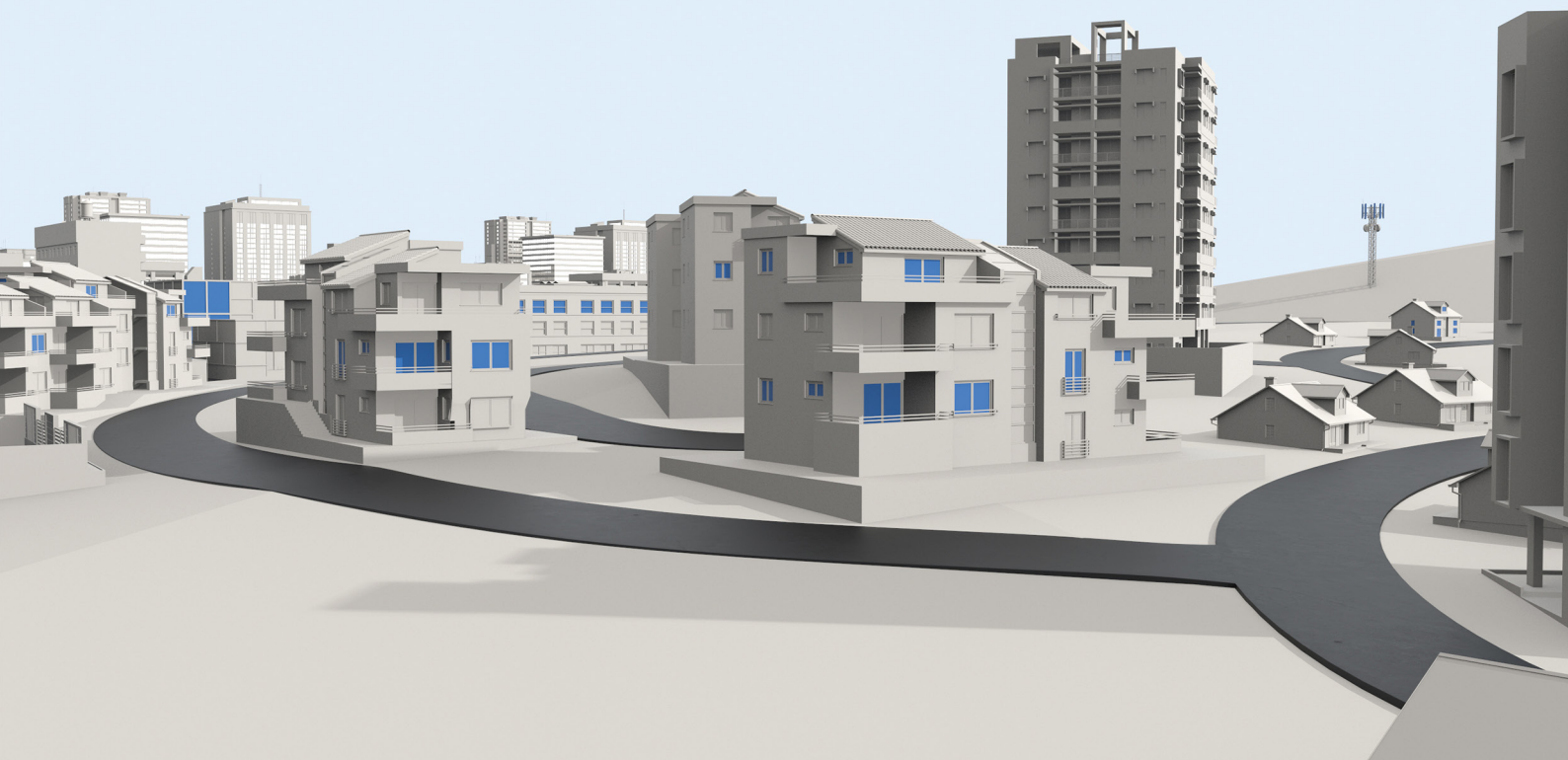
In conjunction with the country's centennial in 2023, the government of the Republic of Turkey has a strategy to ensure the availability of broadband access of at least 100Mbit/s to every home and workplace. Wireless broadband is a key alternative to fixed broadband to help achieve this goal. As its broad holding of Frequency Division Duplex (FDD) spectrum enables Turkcell to deliver both high throughput and capacity through its mobile

network, it is in a strong position to support this strategy by its implementation of FWA.

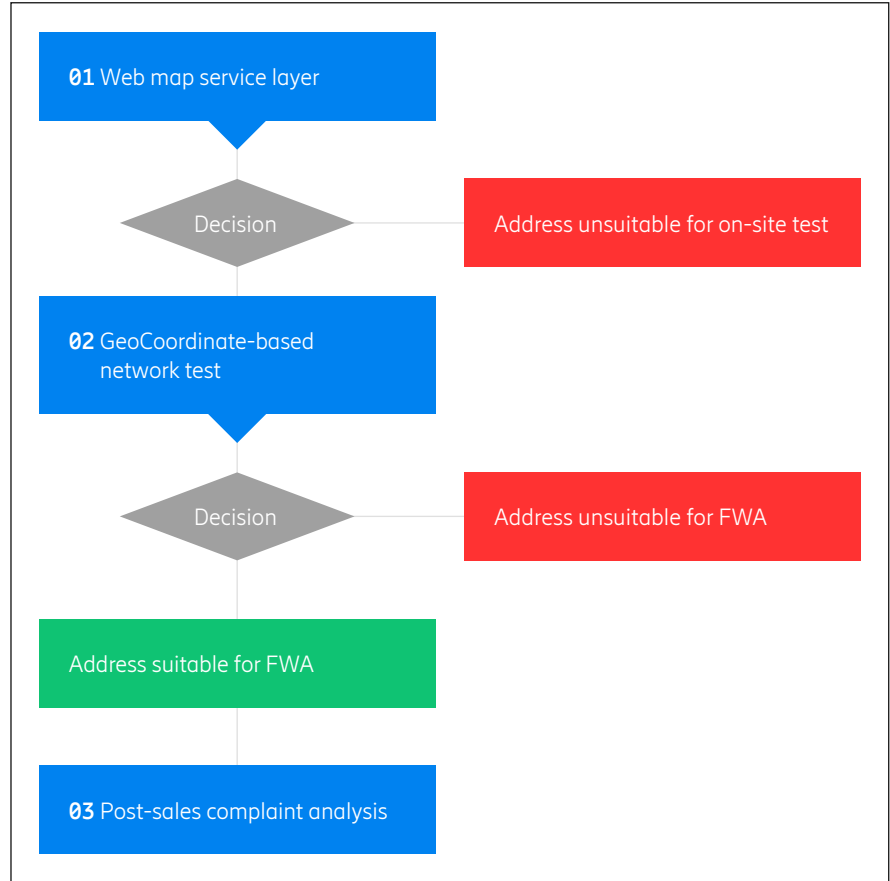
Turkcell launched the 4G FWA service Superbox in August 2017 to offer a premium service using Cat-11, 4x4 MIMO-capable Customer Premises Equipment (CPE). Superbox is a cost-efficient, converged home broadband service aimed at customers who have no access to fiber-based fixed broadband or who are dissatisfied with the performance of their copper-based ADSL connection.

Turkcell recently launched another 4G service, based on a Cat-6 CPE implementation, Superbox EKO (economic), to reach a wider range of users and facilitate mass deployment. Positive experiences for 4G FWA subscribers should create a foundation for introducing customers to 5G FWA. Due to the higher capacity offered by the wide spectrum bandwidth of 5G, it is also an opportunity to offer 5G FWA solutions in locations where household density is high.

This article was written in cooperation with Turkcell, a market-leading converged telecommunications and technology service provider, offering a portfolio of digital services on its mobile and fixed broadband networks in Turkey.



Location-based predictive analysis



> 2x
 Average revenue per user (ARPU) of the FWA service is more than twice that of mobile broadband.

Targeting the right market segments

FWA delivered over a 4G or 5G network is a cost-efficient alternative to providing broadband in areas with limited access to fixed broadband services such as DSL, cable or fiber. Turkcell has an LTE-Advanced network with more than 90 percent population coverage and considerable capacity available in the radio network, with a total of 2 x 64.8MHz FDD spectrum bandwidth in 3 bands (800, 1800 and 2600MHz). These assets have been utilized to offer the 4G FWA service Superbox.

The business case for Superbox is underpinned by the ability to make use of available network capacity, by increasing utilization at locations with spare capacity. Since the customer expectation of FWA services is similar to that of fixed broadband, it is essential to ensure network performance meets the defined FWA quality of service levels. To date, more than 60,000 customers have subscribed to Superbox. Based on Turkcell’s marketing strategy, the service was initially selectively aimed at the premium customer market segment. However, high demand from additional customer segments has resulted in new customer acquisition averaging 8,000 subscribers per month.

There is a range of service packages with different monthly data plans available: 50GB, 100GB, 200GB and unlimited. Average data consumption for subscribers is currently 100GB/month. The average

revenue per user (ARPU) of the service is more than two times that of mobile broadband.

Location-based predictive analysis to ensure quality of service

To meet coverage and capacity requirements, Turkcell developed a location-based predictive analysis tool, consisting of three network-aware digital services (see diagram above). These are:

1. A web map service layer, depicting suitable and unsuitable areas implemented in the Turkcell location intelligence platform to manage marketing and sales activities. The selection algorithm is based on an analytical hierarchy process (AHP) model using some network and sales key performance indicators (KPI) as input parameters.
2. A mobile application developed by Turkcell for use by technical staff to measure the service suitability at a given address. The application is also integrated with the customer relationship management (CRM) platform for sales approval. The results are reported to the sales team as suitable or unsuitable for FWA sales.
3. A location-based web service integrated with the CRM platform to analyze customer complaints relating to temporary coverage loss or capacity problems, in order to respond to the customer automatically.

The tool helps to determine availability of FWA service for any given address, whether in an urban, suburban or rural area, by using network coverage and utilization data. The main goals are to maximize customer satisfaction and eliminate complaints, thereby increasing sales and reducing deployment costs. It is an end-to-end solution which relies upon location-based analytics of network data, as well as radio site measurements performed over a mobile application.

The sales process starts by recording and geocoding the address given by the prospective FWA customer. The address coordinates are used to calculate coverage and capacity of the 4G network, in order to evaluate the type of FWA package that can be offered to the address.

Results achieved using the analytical tools when deploying FWA services have been highly satisfactory. Service availability data based upon coverage and capacity figures from serving LTE cells has mostly been in alignment with measured results from the mobile application, resulting in a deployment success rate of 98 percent. Furthermore, a very low customer complaints rate (0.7 percent) has been achieved.

The process has also resulted in reduced operating costs. The average cost for each site visit is EUR 13, and there is an estimated opex saving for next year of EUR 1.95m due to fewer projected visits. Due to the success of the mobile application, it is planned to implement a customer version of the on-site measurements (mobile application test step) to further save the cost of address visits.

The predictive analysis tool is flexible and customizable to adapt to the requirements of different services, and current criteria sets are configurable to cover changing needs. It can also be used to analyze new technologies such as 5G and IoT. This kind of location-based service deployment and management will be necessary to use resources efficiently and get the most return from 5G investments.

Analysis of the network with intelligent algorithms has significant benefits in sales success, customer satisfaction rate and opex savings and plays a key role in the success of the service's deployment.

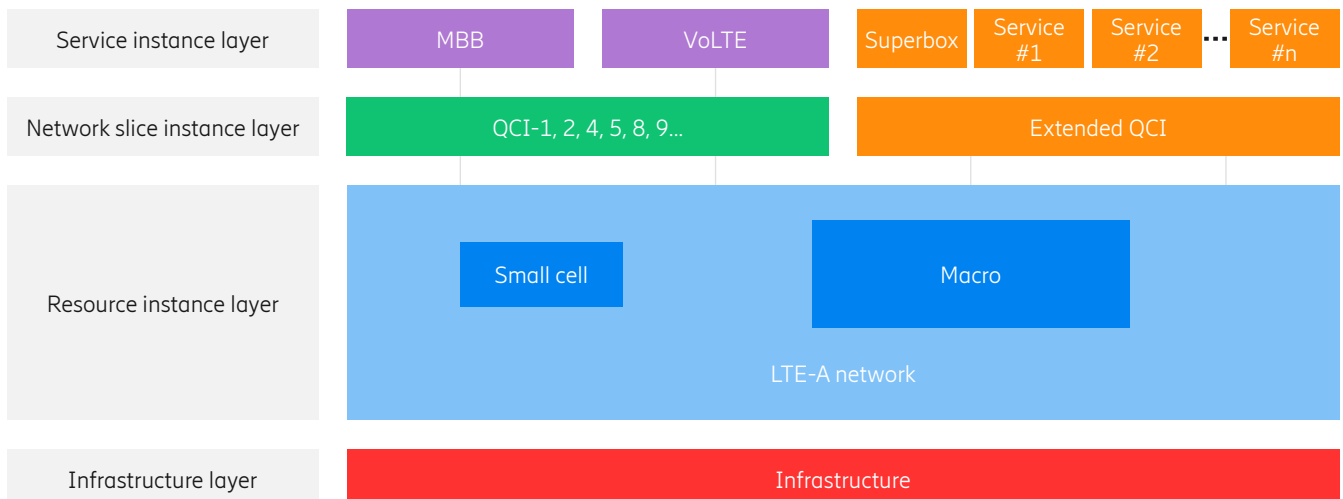
KPI management and service assurance

To ensure successful deployments and the quality of the end-to-end service, some additional integrations have been made:

- Separate quality of service class identifier (QCI) parameter definition. Although a QCI is used to determine the quality thresholds of services, a separate QCI is defined for FWA services in radio and core networks to differentiate the FWA traffic from other data traffic, so that all key performance indicators (KPIs) and statistics for FWA subscribers can be tracked separately. It can be considered a first step towards network slicing, which will be common in 5G.
- KPI collecting-management protocol (TR-069 and variants) is integrated to monitor and remotely control the CPE, e.g. auto-configuration, service provisioning and software upgrade.
- A SIM-CPE matching functionality is activated to prevent inappropriate usage of the SIM with other mobile devices.

In conclusion, FWA enhances the return on investments from the 4G network while playing an important role as a forerunner to the upcoming 5G FWA service. It is an opportunity to provide a high-quality FWA service before the arrival of 5G, which becomes integral to the lifestyles of subscribers. Given the success of the current FWA service coupled with applications for customer self-provisioning and KPI management, Turkcell is now both taking steps to broaden its 4G offering and planning for a 5G FWA roll-out.

Extended quality of service class identifiers (QCIs) defined for Turkcell Superbox services



Source: Turkcell (2019)

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