NOKIA

Finding Mewtwo. What the Pokémon Go phenomenon means for mobile operators

White paper

Pokémon Go has been a game-changer for augmented reality, capturing the imagination of hundreds of millions of players worldwide. But what is the true impact of Pokémon Go on mobile networks? To investigate, Nokia used data from its Wireless Network Guardian deployed in several networks to analyze five key performance parameters. The results will help operators to plan and prepare their networks for the growing augmented reality phenomenon.

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Game changer: augmented reality goes mass market

Has the long-awaited 'killer app' for augmented reality finally arrived? With the advent of Pokémon Go, many industry observers think it has. Changing the behavior of mobile users and creating deep implications for mobile network operators, Pokémon Go is certainly a game changer.

Pokémon Go is a free-to-play, Augmented Reality (AR) game that builds on the globally successful Pokémon franchise that has spawned card games, animated TV series and the second most successful series of console games in history.

Launched for Android and iOS on July 6, 2016, the game quickly took the world by storm, despite it being officially available only in the United States, Australia and New Zealand. The day after its release the game was already on more Android phones than top rated dating app Tinder and by the end of the month, the game had been downloaded 100 million times [1]. Average users spend 43 minutes a day on the game, outstripping such web stars as Instagram and WhatsApp[2].

Meanwhile, Nintendo was reported to have seen a 10 percent rise in its market value within a week of launching the game[3]. Pokémon Go generated more than $440 million in worldwide net revenue from in-app purchases in less than two months since its launch, outperforming many of the year's biggest grossing films[4].

While AR apps have been around for a number of years, Pokémon Go is the first to go mass market. By bringing AR into the mainstream, the game opens the door for other AR apps and games, particularly those that can combine data on location and user profiles to produce targeted advertising. Pokémon Go has laid the foundations for other apps by showing how the AR concept of using maps and locations works and just how captivating an AR game can be.

Pokémon Go – how does it work?

After downloading the Pokémon Go game, the player creates an avatar that is displayed at their current location on a screen map. As the player moves in the real world, their avatar moves accordingly within the game map. Another screen shows the distance to the nearest Pokémon and the player must move to that location. Once within a few meters, the player can view the Pokémon in AR mode, which uses the device's camera and gyroscope to display an image of the Pokémon as if it were in the real world. The player then captures the Pokémon by throwing Poke balls.

There are more than 150 Pokémon Go characters with some, such as Mew and Mewtwo, being extremely rare. It is believed that such characters can only be obtained through special events.

Other features displayed on the map include PokéStops, locations where players can recharge with Poke balls and other virtual aids such as eggs and potions to aid in capturing and nurturing their prey. Some of these virtual items can be bought using in-app purchases. Pokémon gyms serve as battle sites for players to pit their Pokémon teams against each other. Both PokéStops and Pokémon gyms are sited at real world places of interest.

According to a report by ABI Research: "Like many mobile games that see skyrocketing success, it will fade from the headlines in time (perhaps quicker than most expect), while numerous copycat games and apps try to replicate that success. Even so, the impact that it will have on the overall [augmented reality] market is not to be underestimated."

Yet, Pokémon Go's very success has brought new challenges. Flash congregations of players at particular sites have caused traffic congestion, with one widely seen video from Taiwan showing a stream of players moving along a street in pursuit of a reported rare Pokémon. There have also been safety concerns as people become immersed in the virtual world and fail to notice their imminent interface with moving vehicles in the real world.

The game that creates a new set of rules

Mobile operators are concerned about the effect Pokémon Go will have on their network and business models. Asian players are reported to be switching telecom providers and boosting the sales of network access products in a bid to get the best possible network signals in order to play the game better[5].

Immediate concerns center around how it could affect subscriber data plans, and how operators could encourage loyalty by extending "free data usage for Pokémon Go" promotions (6). Will we see the rise of 'Transient Data Events' that show the same type of spikes produced by special, temporary events yet which come and go quickly and cannot be accounted for by conventional network planning?

Unlike many, if not most, other mobile apps, users must play Pokémon Go outside, away from Wi-Fi coverage available in homes, cafes and other well-covered indoor spaces. This puts additional load on the mobile network. Yet, this load is not distributed uniformly. Because the Pokémon characters are found in specific places, congregating players create hot spots that can have a significant impact on a network's Quality of Experience.

To get the hard facts about the potential impact of Pokémon Go on networks, Nokia used data from its Wireless Network Guardian (WNG), as deployed in several operator networks around the globe. The study focused on five parameters affected by Pokémon Go, illustrating one of the strengths of WNG – its ability to zero in on the effects of an individual application.

No surge in data, but pressure on radio resources

Headline findings were good news – Pokémon Go itself does not cause a significant rise in data use, but it can result in heavy use of other network resources that could affect service quality.

The study also looked at how many network users are using the app – not merely those who have downloaded the game, but players who are active, who have launched, played, and more significantly consumed data over the mobile network. The industry average for surveyed networks was between five and eight percent of subscribers, a statistically significant figure considering the active profile of these users.

Looking at how much traffic the game creates and averaging it out across the range of operators sampled, it turns out that Pokémon Go contributes less than 0.6 percent of the total data volume. This suggests that the game is optimized for efficient use of data. It does not cause a surge in traffic and so will not affect the monthly data allocations of a subscriber's plan.

However, the amount of data used by Pokémon Go players increased by about 10 percent overall, although only 15 percent of this was due to Pokémon Go itself. It is likely that other apps were being used by players when out and about searching for characters.

WNG allowed the investigators to look at two critical parameters that help us understand just how Pokémon Go can affect network resources – radio spectrum use (calculated as "Airtime") that directly correlated to Airtime usage, and the request for a radio channel connection (termed "RF-Conn" in WNG). Results show a significant increase of both Airtime and RF-Conn attributed to Pokémon Go.

RF-Conn setups count the number of times a radio channel has been requested by a user. In an LTE network, these requests are handled by the Mobility Management Entity or MME – if requests reach a significantly high level, the MME resources can become overloaded, leading to service requests being processed much more slowly. In extreme cases, an overloaded MME can shut down, leading to no service requests being fulfilled and the network suspending service.

For Pokémon Go, RF-Conn was measured at 0.8 percent to 1.8 percent of the total network RF-connections. Considering the number of active players in networks, this is a relatively high figure.

Airtime measures the actual time that a radio channel has been allocated to a mobile phone - not the amount of time a user is playing Pokémon Go, but the amount of time that the player, using Pokémon Go, has spent actively and exclusively using a radio channel.

Using WNG Nokia discovered that Pokémon Go was taking up 2.0 percent to 3.9 percent of entire network airtime. WNG is also able to show how much airtime Pokémon Go is using in each cell, allowing operators a better understanding of surge behavior at cells and how it affects overall subscriber experience, both for Pokémon Go players and other users.

Table 1: The key findings from Nokia's Wireless Network Guardian (WNG) analysis of networks supporting Pokémon Go

Low data usage. Unlikely to strain most data plans on its own	Pokémon Go contributes 0.26% to 0.56% of entire network data traffic
"Chatty" application	Pokémon Go **RF connection setups** account for 0.8% to 1.8% of total RF connection signaling
Significant use of radio resources	Pokémon Go **Airtime** accounts for 2.0% to 3.9% of total airtime resources

Figure 1: Airtime does not represent the amount of time a user is playing Pokémon Go. Airtime represents the amount of time that the player, using Pokémon Go, has spent actively and exclusively using a radio channel resource
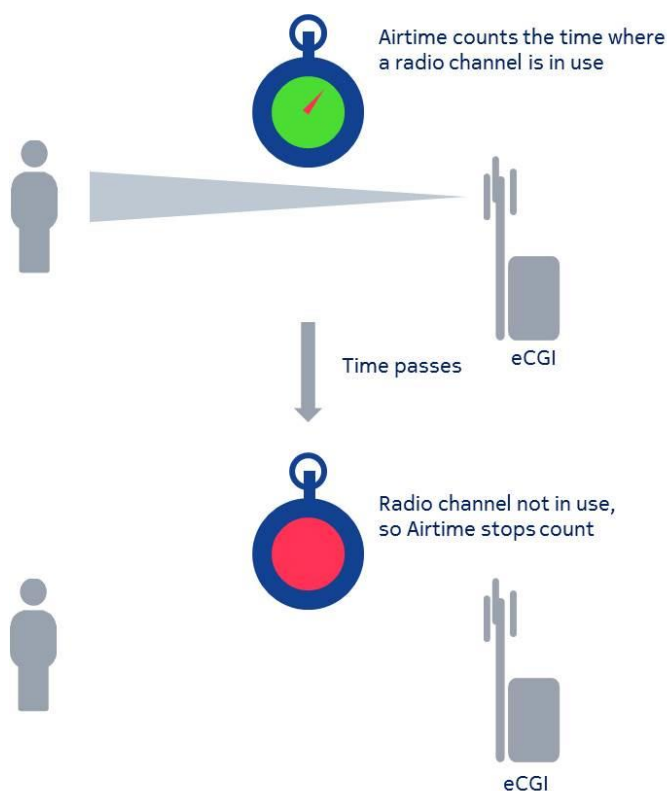
Safeguarding your network

Nokia's WNG is a mobile network analytics product that provides the crucial information needed for deeper understanding of what is happening in a mobile data network. With WNG, an operator will always know what the customer is actually experiencing. A real-time, multivendor, multi-technology (2.5G/3G/LTE) product, WNG taps into the RAN and the core network, monitoring the mobile signaling and IP flows generated by the devices and the network.

WNG captures, processes and correlates this information to offer analysis of network performance, subscriber quality of experience (QoE) and usage trends, providing powerful insights that can be used in operations, engineering and marketing.

The solution is a powerful platform for analyzing networks, giving operators an understanding of how the six most critical factors in a network interact with each other - subscriber, device, application, network, signaling, and IP flows. Among other things, WNG can be used to understand the signaling/volume ratio of applications such as Pokémon Go and discover the RAN network elements most affected by an increase in signaling.

WNG serves as the real-time "monitor and analyze" building block in mobile traffic management and optimization solutions. With real-time network intelligence, it can help operations managers act to prevent high utilization, using techniques such as bandwidth throttling, Wi-Fi offloading, prioritization and video/content optimization to prevent congestion.

WNG is integrated with Nokia CEM on Demand (available off-the-shelf) to enable additional uses in marketing, care and data monetization. Examples include individual subscriber diagnosis for care agents, targeted promotions based on micro-segmentation or Pokémon Go player usage, and movements for partners.

Figure 2: Wireless Network Guardian: a unique understanding of inter-relationships between six dimensions

Conclusion: preparing for more augmented reality

Pokémon Go and other AR apps, with their ability to change user behavior, also open up new opportunities for revenue generation. With increased foot traffic to specific locations comes more people to view what is on offer at that location, providing further opportunities for promotion or selling of goods and services. Sprint in the US, and MacDonald's in Japan are using Pokémon Go to increase foot traffic to their properties, opening up the potential to capitalize on the analytics of subscriber movements, testing the effectiveness of advertising and the potential of specific special events.

Operators are understandably wary of the impact that the runaway success of AR apps like Pokémon Go will have on their networks. With makers Niantic announcing that more AR apps are planned for 2017, the need has never been greater for an analysis solution that can keep track of what it all means for mobile operators, their businesses, and their customers.

Nokia recommends a three-stage process to address the network challenges of Pokémon Go:

Insight: Using Nokia's WNG real-time analytics capability, operators can correlate Pokémon Go's use of network resources and user experience.

Reactive action: Integrating Nokia WNG with the operator's policy management systems enables automated traffic management for selective bandwidth optimization at Pokémon Go hot spots.

Preventive action: Nokia's Network Planning and Optimization (NPO) together with Analytics Office experts will recommend and implement end-to-end optimization to improve network and app performance. Predictive Optimization can help operators to plan ahead and avoid capacity bottlenecks that would degrade the Pokémon Go experience for players.

References

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