HORIZON 2020

Mobile Application for Hybrid Internet

Berichterstattung

Projektinformationen

MPA

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Projektwebsite

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Periodic Reporting for period 2 - MPA (Mobile Application for Hybrid Internet)

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Zusammenfassung vom Kontext und den Gesamtzielen des Projekts

The phenomenal growth of smartphone traffic is not going to slow down anytime soon. Indeed, with the advent of unlimited data plan the average mobile data traffic is expected to grow from 9 GB per month in 2020 to 46 GB per month by 2028 (Ericsson Mobility Report – November 2023). However, this phenomenal growth does not translate into a similar growth of revenues for the mobile operators, who, at best, can benefit from a single-digit increase of their ARPU (average revenue per user). These mobile operators a facing a difficult equation: they must invest in their network to increase its capacity while their revenues are flat.

So, what are the levers of the operators to address this challenge? First, they are deploying new generation 5G networks whose capacity is much higher (in other words, the cost per GB will be lower). Then, they need to find better ways to offload as much smartphone traffic as possible onto Wi-Fi: the cost per GB carried over a Wi-Fi network is 20 to 100 times cheaper than over a mobile network.

No doubt, both cellular and Wi-Fi networks are needed to support the growth of the smartphone traffic and the introduction of 5G will not change the operator's desire to "maximise Wi-Fi offload"; however, until now offload has often come at the cost of poor user experience, hence the growing interest in seamless handover between Wi-Fi and cellular (4G/5G) access networks.

Mobile Network Operators (MNOs) and Mobile Network Virtual Operators (MVNOs) have deployed, or partnered with, Wi-Fi networks with the objective to offload traffic from their cellular networks. However, currently the offload user experience is not seamless. Offloading started with separate Wi-Fi and cellular networks (users needed to authenticate to the Wi-Fi hotspot in order to offload cellular traffic) and, more recently, was upgraded to automatic connections (users automatically connect to Wi-Fi hotspots through their cellular credentials with Hotspot 2.0 or similar technologies).

Many times, however, users were automatically connected to poor performing network connections and the transition between the two networks was not seamless. Consequently, consumers switch off Wi-Fi due to perceived issues with Wi-Fi performance, concerns over the security of public Wi-Fi access points and unlimited cellular data plans disincentivising the use of Wi-Fi. The problem is that consumers forget to switch Wi-Fi back on again when Wi-Fi would provide a better experience. Operators have no control or insight into this, but it results in the consumption of excess cellular data. With automatic Wi-Fi attachment, operators wanted to increase offload, but they are getting less of it.

The telecom ecosystem is on a well-articulated trajectory towards greater convergence:

• Consumers are more and more keen to purchase all their telecom services from the same Communications Service Provider - CSP (one-stop shop) who in return enjoys higher loyalty (the greater the number of services, the lower the churn);

• Network convergence: while the variety of access technologies continues to widen with the rollout of 5G, WiFi6, Fiber or CBRS, CSPs are eager to control all these access technologies from a single and convergent core network;

• Mature Wi-Fi roaming technologies allow for partner networks to be added to a carrier's offering.

• When combined, these trends will offer an enhanced experience to data-hungry smartphone users who will seamlessly transition from one network to another.

MPA is an end-to-end software solution that will allow smartphones to connect simultaneously and seamlessly to both cellular and Wi-Fi networks. To maximise the adoption of this solution, MPA relies on the following principles:

• It must provide continuity of the connection while moving from cellular to Wi-Fi and vice versa in such a way that end-user don't notice it;

• It must provide true network aggregation, i.e. both networks can be used at the same time for the same application. Example: a Netflix video stream is split and a part of the data is carried over the cellular network while the rest is carried over the Wi-Fi network, and this is completely transparent to

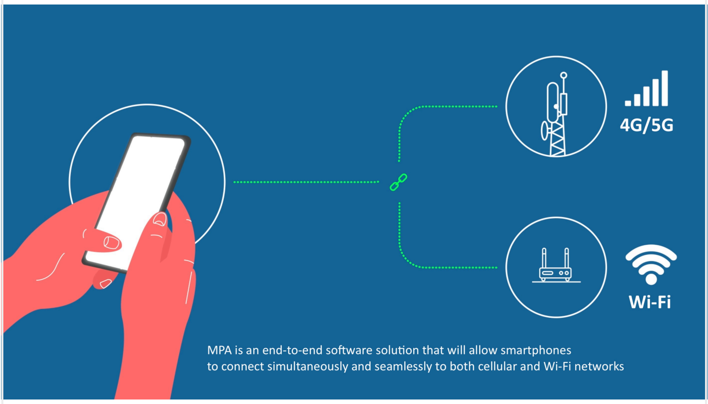
the end-user;
• It must be compatible with Apple iOS and Google Android, the two dominant operating systems of smartphones;
• It must rely on standardised technology. Indeed, in the telecom ecosystem, standardised approaches are favoured over proprietary implementations.
The MPA project has delivered the expected outcome which was demonstrated during pilot phases with several operators in the USA and in Europe and is now ready for next phases towards a commercial deployment (once the smartphone operating systems are updated with the compatible capabilities).

Arbeit, die ab Beginn des Projekts bis zum Ende des durch den Bericht erfassten Berichtszeitraums geleistet wurde, und die wichtigsten bis dahin erzielten Ergebnisse

Since the beginning of the project, we have focused on the following activities:
o The contribution to standardization bodies (namely 3GPP and IETF) where the underlying specifications of the MPA solution have been frozen:
3GPP Release 16 (frozen in June 2020) introduces a new capability called ATSSS (Access Traffic Steering, Switching and Splitting) which delivers Wi-Fi cellular convergence. Following the publication of this specification, we introduced a request for amendment (which was accepted) since this had a material impact on the software development activities;
IETF RFC 8803 (released in July 2020) defines a new protocol (0-RTT TCP Convert Protocol) used by the ATSSS function (3GPP Release 16). The main author (Prof. Olivier Bonaventure) of this spec is one of the co-founders of Tessares.
The publication of these two standards was a stepping stone for the MPA solution.
The definition of an authentication mechanism in collaboration with two US operators (Comcast and Charter Since the beginning of the project, we have focused on the following activities:
• Implementation of the MPA solution and lab testing. Several iterations of the solution have been implemented and in particular:
o The support of the 0-RTT TCP Convert Protocol;
o The very scalability of the solution;
o The full telco cloud support.
• Validation of the solution in our lab.
• Collaboration with Apple: we have provided the network node (called HAG) that we have developed to Apple so that they could test the interoperability of their iOS development agains our HAG.
• Validation of the solution with operators:
o With Comcast (USA): lab test followed by internal FUT in the Philadelphia region
o With Charter (USA): extensive lab test with thousands of test iterations;
o With British Telecom and Deutsche Telekom: collaboration in the context of the GSMA ZTC (Zero Touch Connectivity) initiative which resulted in a live demo during Mobile World Congress 2022 in Barcelona;

Fortschritte, die über den aktuellen Stand der Technik hinausgehen und voraussichtliche potenzielle Auswirkungen (einschließlich der bis dato erzielten sozioökonomischen Auswirkungen und weiter gefassten gesellschaftlichen Auswirkungen des Projekts)

While the demand for more mobile data continues to growth, there are also several challenges to address:
• availability of spectrum
• electrical consumption: when the energy prices started to surge, operators realized how much they are exposed to energy prices and all of them are looking for ways to reduce their consumptions. Studies indicate that sending data over a mobile network requires as much as 20 times more energy than sending data over a Wi-Fi network
By seamlessly combining Wi-Fi and cellular accesses, MPA helps making a better use of the radio assets, which will lead to a better use of scarce resources, and to save energy.



MPA end-to-end software solution

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