WHITE PAPER

# Real-World Impact of Mobile Edge Computing (MEC)

The impact of Mobile Edge Computing (MEC) on the mobile subscriber's experience is so profound that MEC has become an integral part of 4G networks around the world. To illustrate the effect of MEC, this paper describes the impact of MEC trials at two major international events: The Mobile World Congress* held in Barcelona in February 2016, and the worldwide acclaimed motor racing event held at the Shanghai International Circuit* in April 2016.

## Delivering ultra-low-latency video at busy locations

The GSMA Innovation City at the Mobile World Congress provides hands-on experiences on how mobile products are improving people's lives. This year EE*, the UK's largest Mobile Network Operator (MNO), demonstrated two powerful ways that MEC can change the way people experience a major event. Both demonstrations evolved around the delivery of ultra-low-latency video over the LTE network.

EE leveraged the Nokia* Edge Video Orchestration application running at the network edge to deliver the Mobile World Live TV service simultaneously to multiple LTE-enabled smartphones and tablets.[1] Latency of just a few hundred milliseconds provided a real-life experience to conference attendees that truly complemented the thrill of the live event.

EE's second demonstration showed a secure, high-performance technology for managing crowd safety and reporting incidents. It illustrated how mobile connectivity can be used to maintain a high level of safety for attendees. On-site security personnel wore LTE-connected bodycams, generating multiple video streams back to a central control room. Ultra-low-latency enabled the control room staff to provide immediate and complete situational awareness.

## Enabling a fully immersive user experience

This year the worldwide acclaimed motor racing event was held in Shanghai International Circuit. Most people would be thrilled to attend a motor racing event. Now imagine while there you could also see on your personal device real-time videos of events on and off the track. You could see the expression of the driver as he takes a corner, or watch the leading cars at different viewing angles, all while interacting with the social media and press at the event. These real-time capabilities can transform the event from an enjoyable day at the races to a fully immersive user experience.

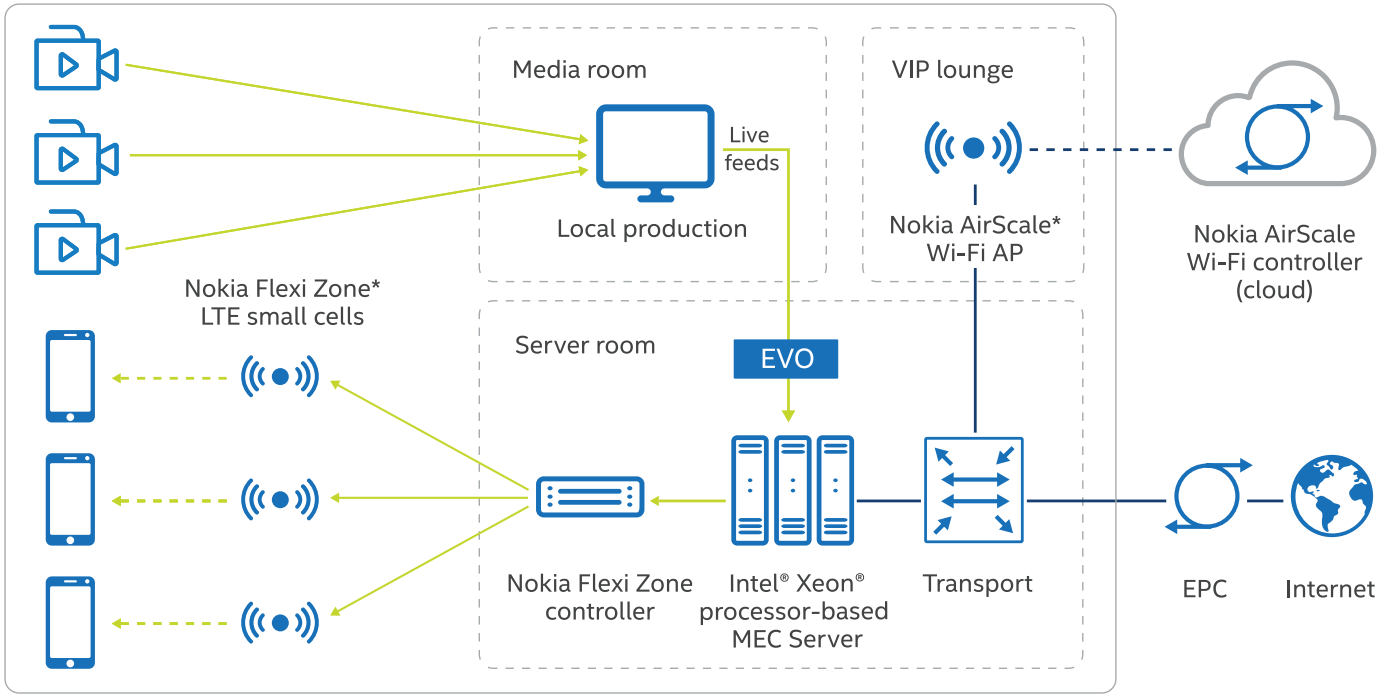



**Figure 1. MEC trial network architecture**

Sports events represent one of the most challenging environments for an MNO. They are characterized as having a large number of people gathered in a contained area, a high demand of locally relevant content, significant video traffic where subscribers download the same content, often in the same location, and a demand for a real-time viewing experience coupled with a highly vocal intolerance for any notable delay.

China Mobile* took on the challenge of providing attendees with the ability to watch multiple real-time high-definition videos. To meet the technical challenges of delivering massive amounts of data to spectators in real-time, China Mobile implemented a large scale implementation of MEC coupled with Nokia's Edge Video Orchestration (EVO) application. This solution allowed spectators to access multiple real-time high-definition video feeds on their mobile devices with close to zero latency. Using an ultra-dense heterogeneous network (HetNet) of LTE/Wi-Fi capable small cells, China Mobile met the demand for massive connectivity, capacity, and low latency at this global high-traffic event.

## MEC is integral to delivering 4G services

MEC is a network architecture concept that enables cloud computing capabilities and an IT service environment at the edge of the cellular network. MEC enables applications and related processing tasks such as content caching and media processing to run closer to the mobile subscriber.

MEC is transforming the way services are being delivered to mobile subscribers. Not only does it improve the user experience by providing high availability of content with reduced latency, MEC also puts control of the service delivery in the hands of the MNO. This is important for two key reasons. Firstly, and of utmost importance, is that it allows the MNO to manage the user experience. Secondly, it enables the MNO to rapidly deploy new applications and services for their subscribers, supporting localization of content, features, and services.

MEC can be positioned as a 4G evolution technology that is enabling new approaches to deliver subscriber services over today's LTE networks. A key advantage of MEC is that it can be implemented transparently within the existing 3GPP 4G mobile network infrastructure. Going forward, MEC is expected to be an integral part of the 5G specifications.

Nurit Sprecher, ETSI* MEC ISG chairperson, stated, "Our progress to date and the variety of proof-points is a testament to the reality of MEC. We see MEC as the enabler of ultra-

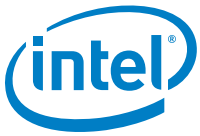
low latency that will be integral to 5G, but which is already available today using LTE and our MEC platform.[2] MEC delivers capabilities that have never been seen before, such as the ability to process and analyse information at point-of-capture, at the very edge of the network that increases awareness and accelerates reaction times."

## The technology behind these MEC trials

The technology behind EE's inspiring demonstrations at Mobile World Congress and China Mobile's successful field test at the Shanghai International Circuit was designed and developed by Nokia and run on the Intel® Xeon® processor. The MEC network architecture for this solution is illustrated in Figure 1. Intel and Nokia are leveraging MEC to enable MNO solutions that deliver ultra-low latency and high reliability for content delivery and cloud applications.

MEC is a foundational technology that seamlessly integrates applications from Telecommunications Equipment Manufacturers (TEMs), service providers, and third party vendors into the fabric of connectivity networks.

The MEC platform from Nokia extends applications and services that would normally reside within the Internet or the MNO's data center, to the very edge of the network, and in close proximity of the mobile subscriber. An MNO's dense network of base stations is transformed into a Nokia AirFrame cloud server. The Nokia AirFrame* solution uses the Data Plane Development Kit (DPDK) combined with Intel® Virtualization Technology (Intel® VT).



To learn more about Intel® Network Builder partners for MEC solutions powered by Intel, visit **https://networkbuilders.intel.com/solutionscatalog**.

Footnote:
[1] Mobile World Live TV is a dedicated channel that broadcasts live from Mobile World Congress. https://www.mobileworldcongress.com/news/mobile-world-live-tv/

[2] Liquid Applications is a content delivery platform. http://company.nokia.com/en/news/press-releases/2014/09/04/nokia-networks-introduces-advanced-content-delivery-solutions-extends-liquid-applications-networksperform



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