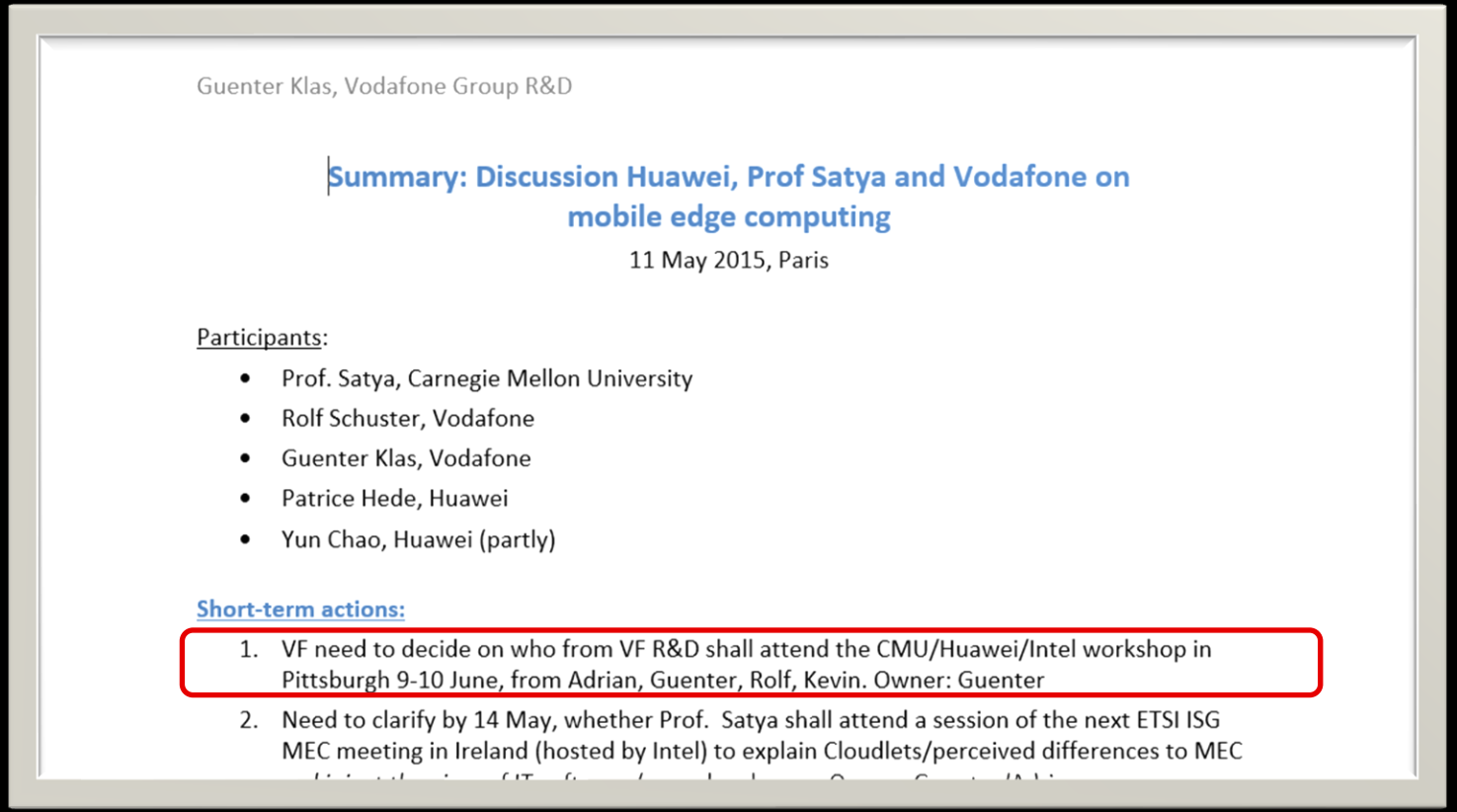
OEC Graduation

22nd April 2022

Guenter Klas

Stepping back in history: a meeting in Paris

11 May 2015



Guenter Klas, Vodafone Group R&D

Summary: Discussion Huawei, Prof Satya and Vodafone on mobile edge computing

11 May 2015, Paris

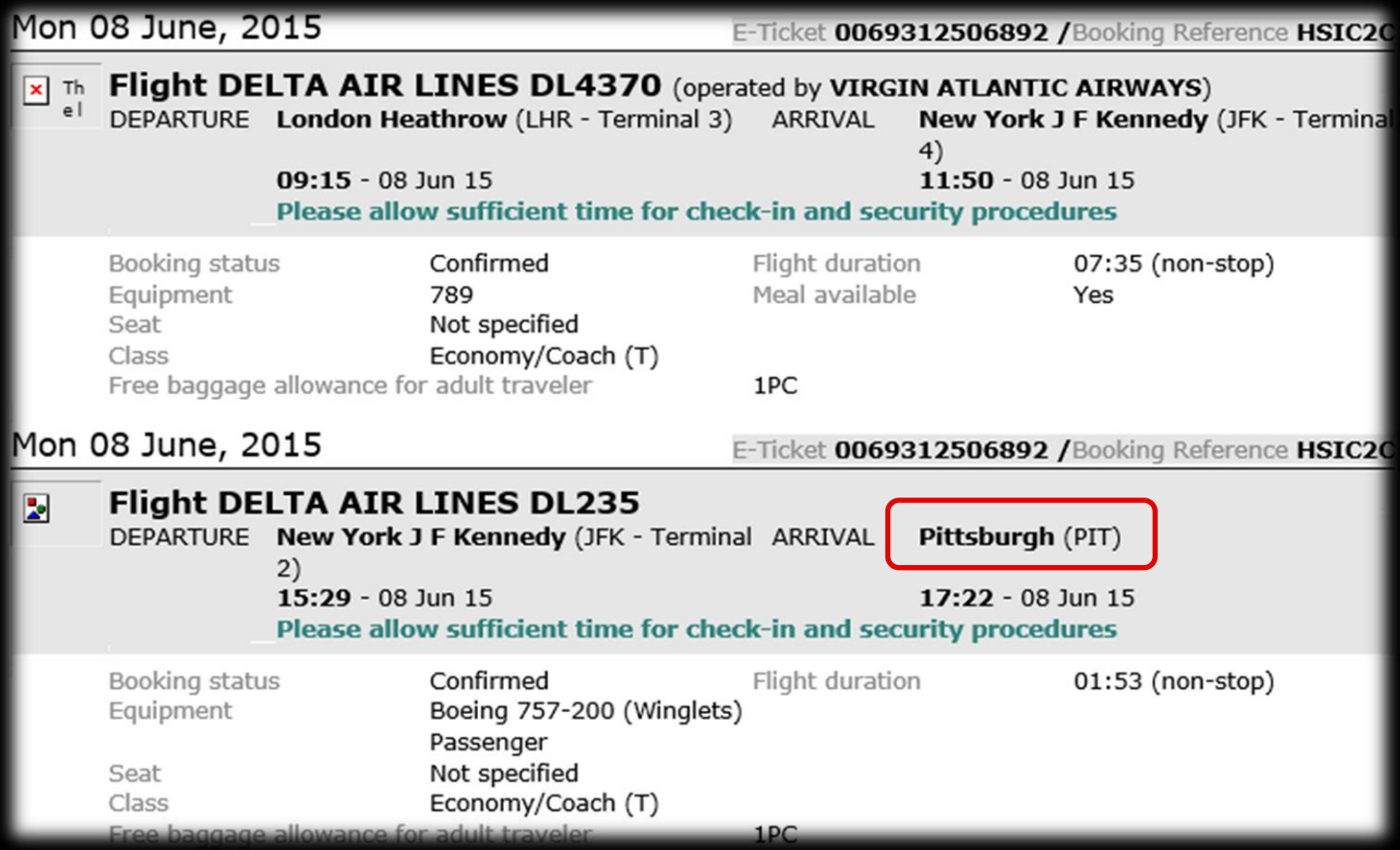
Participants:

- Prof. Satya, Carnegie Mellon University
- Rolf Schuster, Vodafone
- Guenter Klas, Vodafone
- Patrice Hede, Huawei
- Yun Chao, Huawei (partly)

Short-term actions:

1. VF need to decide on who from VF R&D shall attend the CMU/Huawei/Intel workshop in Pittsburgh 9-10 June, from Adrian, Guenter, Rolf, Kevin. Owner: Guenter
2. Need to clarify by 14 May, whether Prof. Satya shall attend a session of the next ETSI ISG MEC meeting in Ireland (hosted by Intel) to explain Cloudlets/perceived differences to MEC

Leading to a flight to Pittsburgh



Mon 08 June, 2015 E-Ticket **0069312506892** / Booking Reference **HSIC2C**

Th
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Flight DELTA AIR LINES DL4370 (operated by **VIRGIN ATLANTIC AIRWAYS**)

DEPARTURE **London Heathrow** (LHR - Terminal 3) ARRIVAL **New York J F Kennedy** (JFK - Terminal 4)

09:15 - 08 Jun 15 **11:50** - 08 Jun 15

Please allow sufficient time for check-in and security procedures

Booking status	Confirmed	Flight duration	07:35 (non-stop)
Equipment	789	Meal available	Yes
Seat	Not specified		
Class	Economy/Coach (T)		
Free baggage allowance for adult traveler		1PC	

Mon 08 June, 2015 E-Ticket **0069312506892** / Booking Reference **HSIC2C**

Flight DELTA AIR LINES DL235

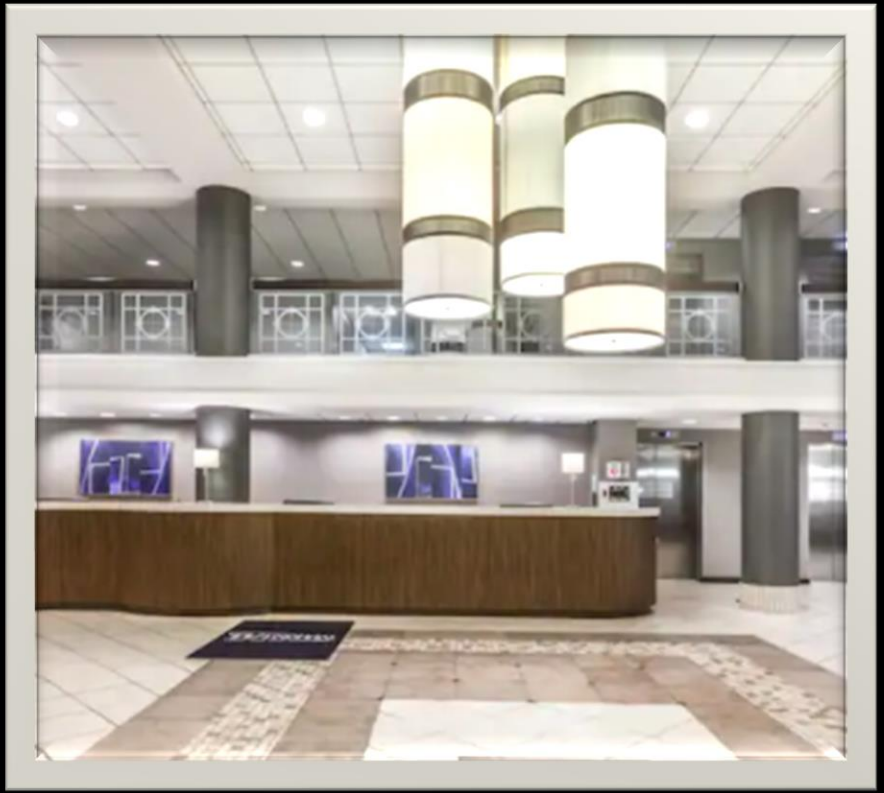
DEPARTURE **New York J F Kennedy** (JFK - Terminal 2) ARRIVAL **Pittsburgh** (PIT)

15:29 - 08 Jun 15 **17:22** - 08 Jun 15

Please allow sufficient time for check-in and security procedures

Booking status	Confirmed	Flight duration	01:53 (non-stop)
Equipment	Boeing 757-200 (Winglets) Passenger		
Seat	Not specified		
Class	Economy/Coach (T)		
Free baggage allowance for adult traveler		1PC	

Destination: Wyndham University Center



Next morning – 9 June 2015

Gates (and Hillman) centers

Kick-off for Open Edge Computing in 2015

Open Edge Computing – Kick-off Workshop

Workshop Participants:

Carnegie Mellon University: Yoshihisa Abe, Brandon Amos, Zhuo Chen, Khalid Elgazzar, Benjamin Gilbert, Jan Harkes, Kiryong Ha, Wenlu Hu, Prof. Mahadev Satyanarayanan
Huawei: Patrice Hédé, Yun Chao Hu, Prakash Ramachandran
INTEL: Valerie Young, Michael Kozuch, Joe Cahill (dial-in), Sean Mooney (dial-in),
Vodafone: Guenter Klas, Rolf Schuster, Adrian Neal (dial-in), Kevin Smith (dial-in)

Kick-off Workshop Objectives:

- Sync on Cloudlet Vision and Business Opportunities
- Sync on Technology Architecture and Components
- Agree Work Program for engagement with IT-Industry
- Agree alignment plan with ETSI MEC Industry Specification Group

Workshop Location: GHC 9115 (Gates Hillman Complex on CMU campus)

Workshop Agenda

Tuesday, June 09, 2015	
08:00 am	Coffee and continental breakfast available
08:30 am	Welcome and Introduction of Participants (Prof. Satya, Rolf)

Cloudlets – Ready to go ‘open’

Pittsburgh
9-10 June 2015

Cloudlets

An Open Ecosystem for Mobile-Cloud Convergence

Mahadev Satyanarayanan

School of Computer Science

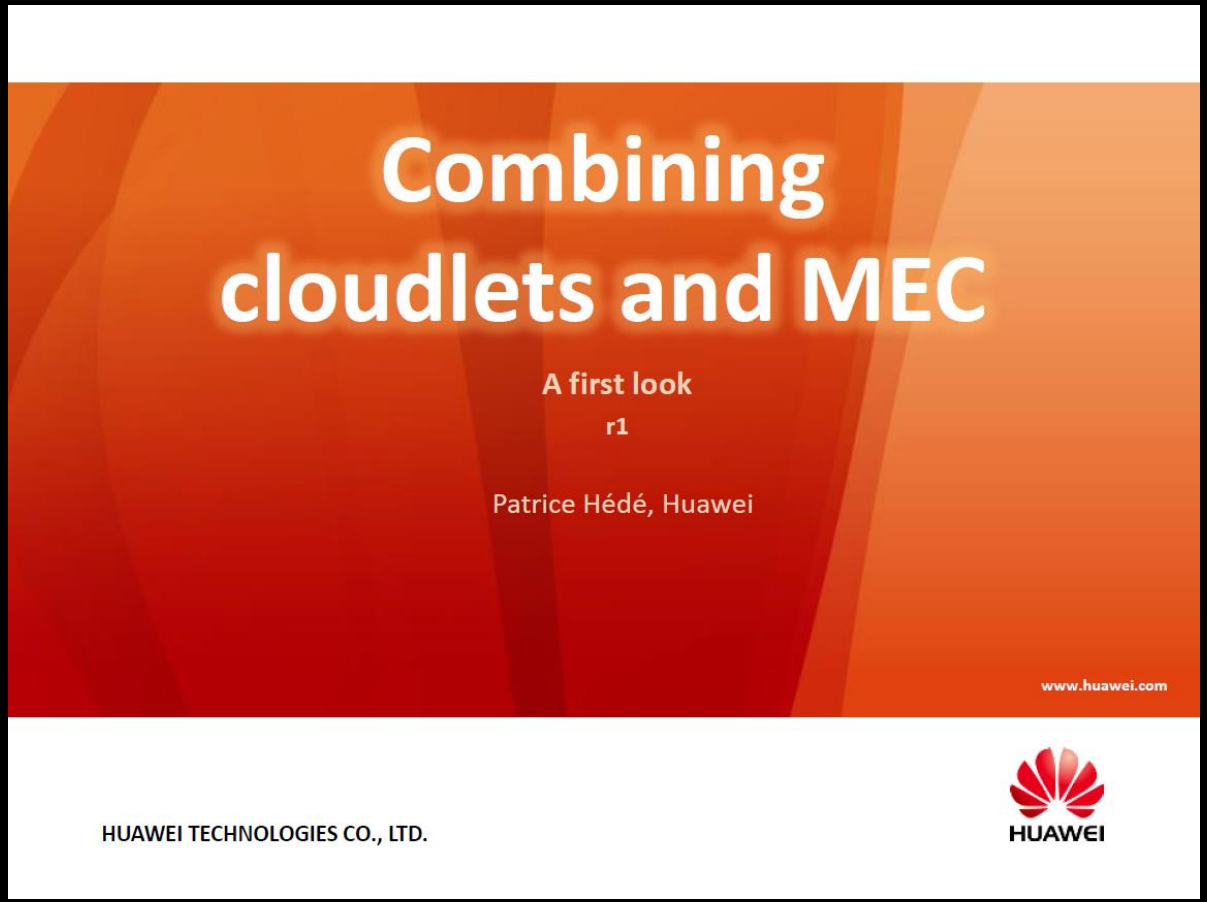
Carnegie Mellon University

http://elijah.cs.cmu.edu

Joint work with: Yoshihisa Abe (CMU), Brandon Amos (CMU), Victor Bahl (Microsoft Research), Vas Bala (IBM Research), Jeff Boleng (CMU-SEI), Ramon Caceres (AT&T Research), Zhou Chen (CMU), Sarah Clinch (Lancaster University), Nigel Davies (Lancaster University), Roxana Geambasu (Columbia University), Benjamin Gilbert (CMU), Kiryong Ha (CMU), Jan Harkes (CMU), Martial Hebert (CMU), Wenlu Hu (CMU), Kaustubh Joshi (AT&T Research), Grace Lewis (CMU-SEI), Ed Morris (CMU-SEI), Padmanabhan Pillai (Intel Labs), Wolfgang Richter (CMU), Dan Siewiorek (CMU), Soumya Simanta (CMU-SEI), Pieter Simoens (University of Ghent), Roy Want (Google), Yu Xiao (Aalto University)

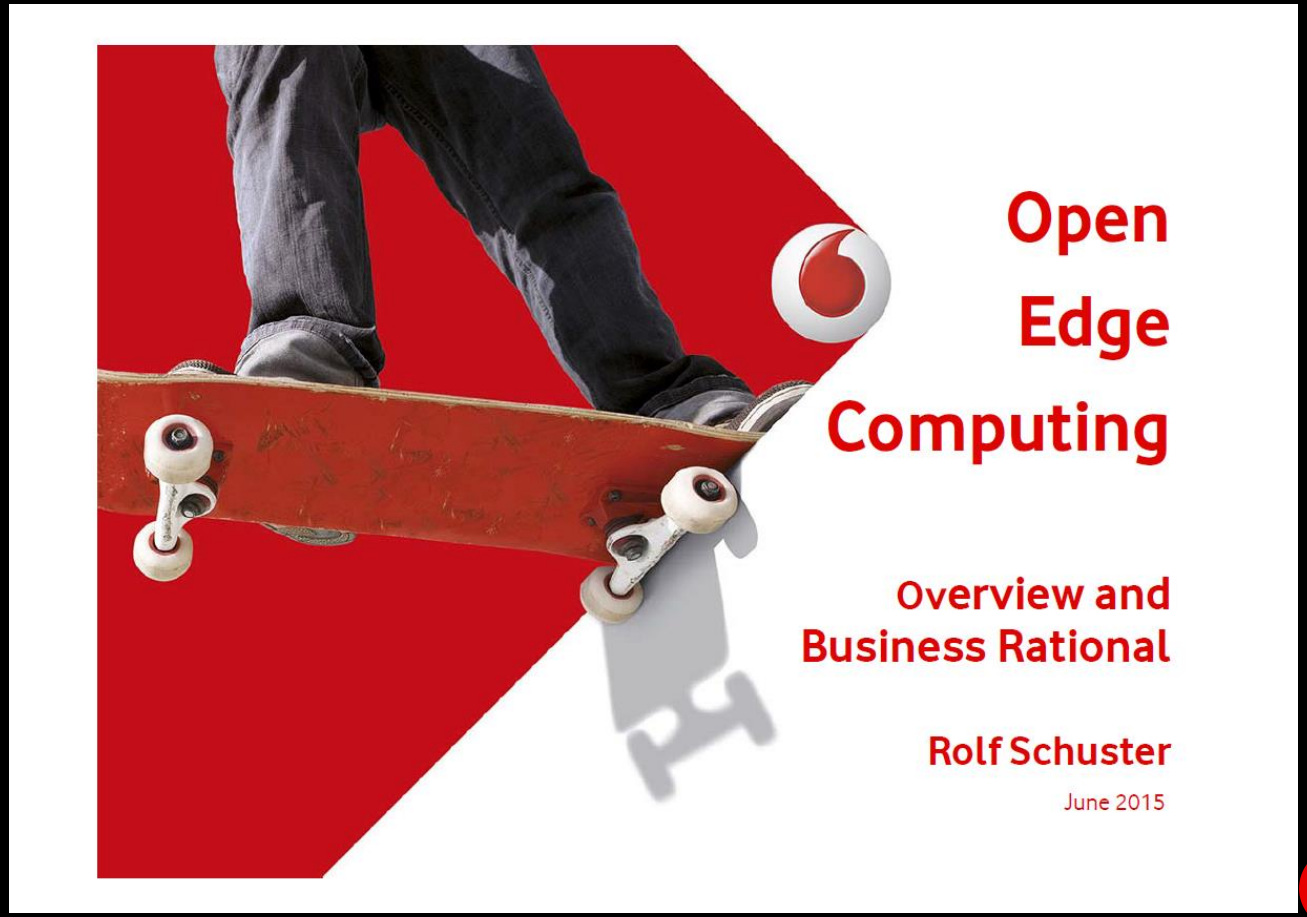
Building on Cloudlets and MEC

Pittsburgh
9-10 June 2015



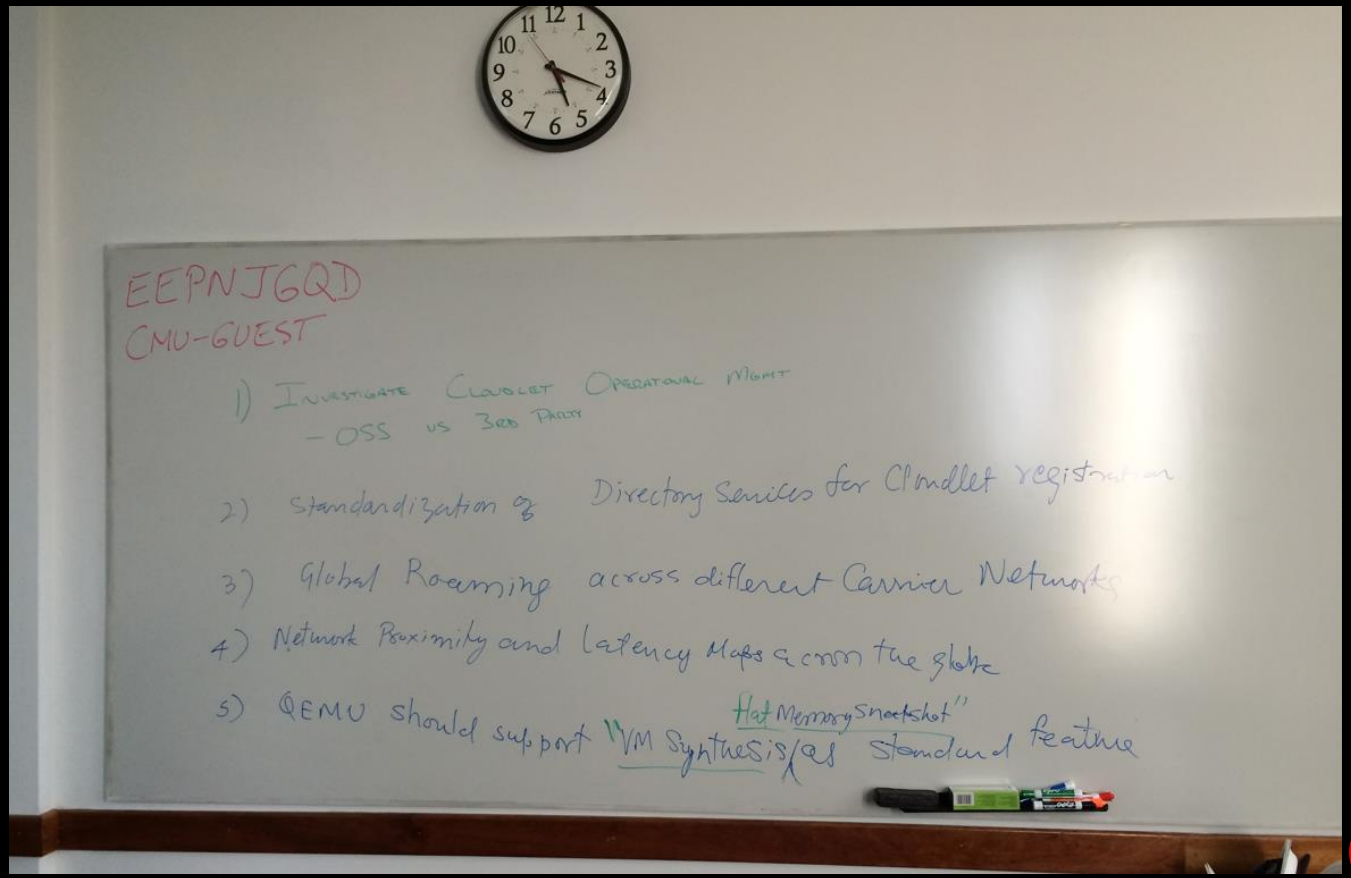
Sowing the seeds for Open Edge Computing

Pittsburgh
9-10 June 2015



Then and later, we always worked long hours, right up to dinner time

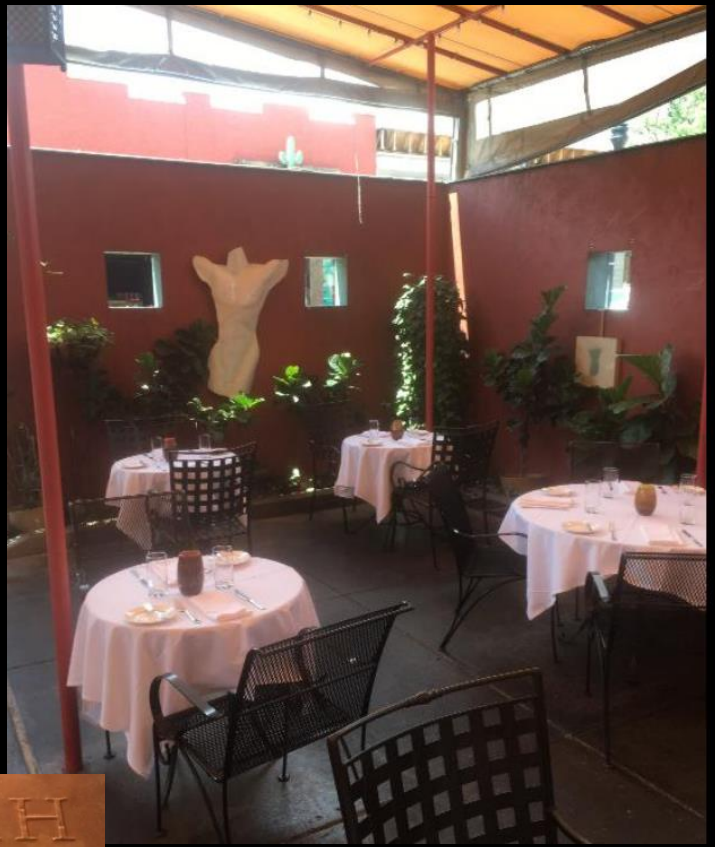
10 June 2015



Either to go here to pray for the future of Open Edge Computing...

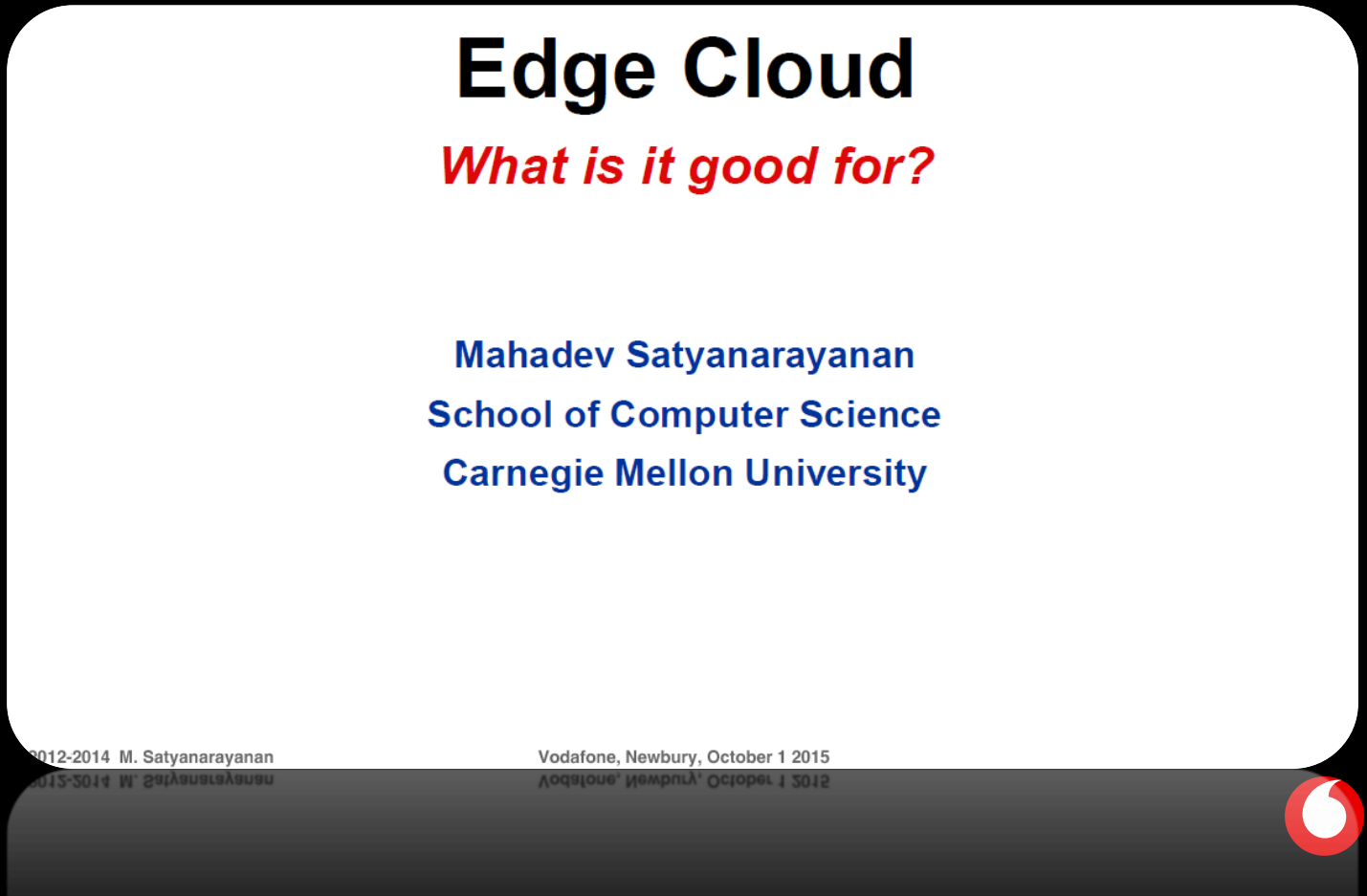
Cathedral of beer

Or to sit down to dine with the crème de la crème of edge computing



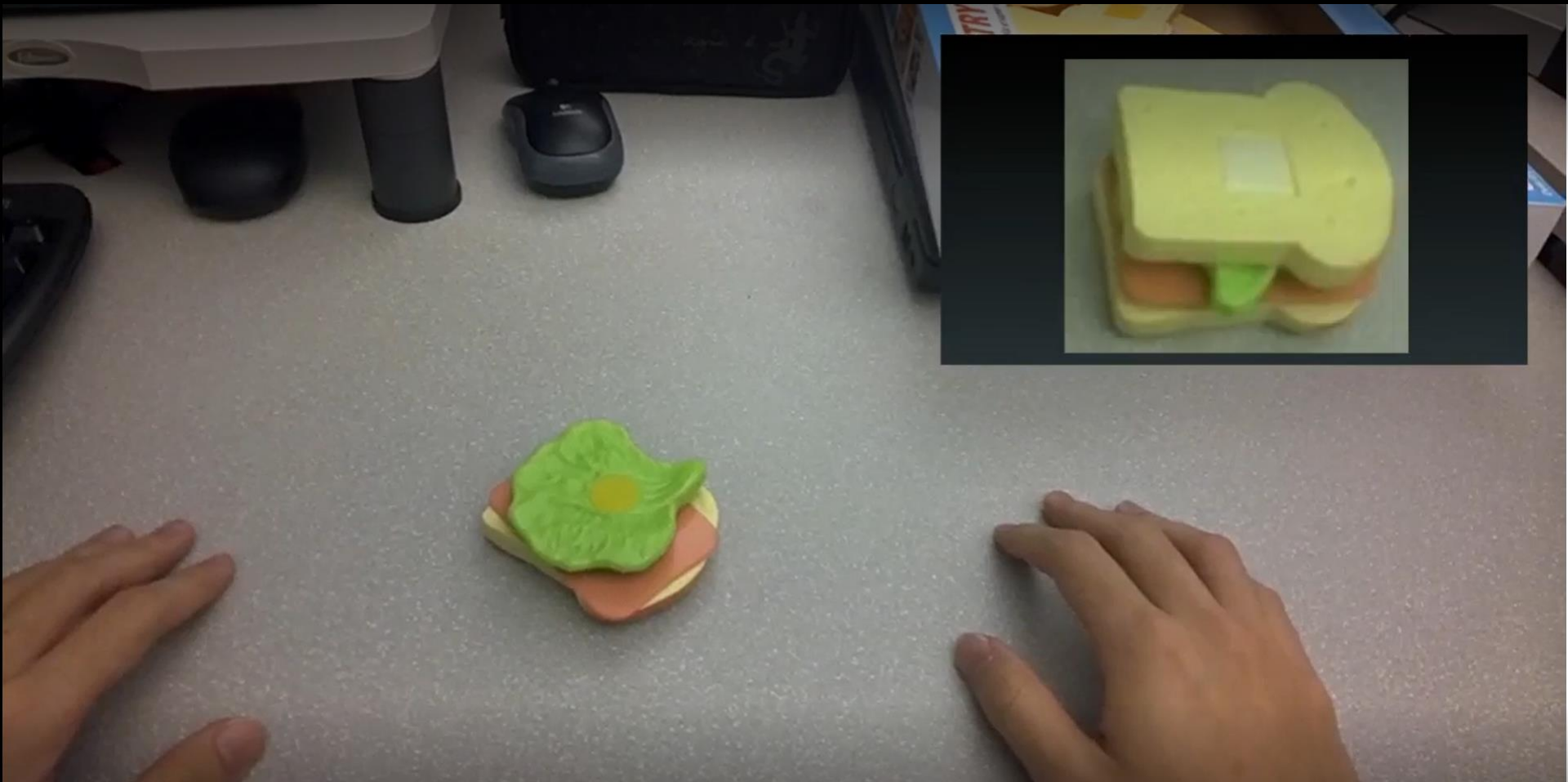
Soon after: Time to educate the business about the New Thing

1 Oct 2015,
Visit to Vodafone headquarters in Newbury, UK

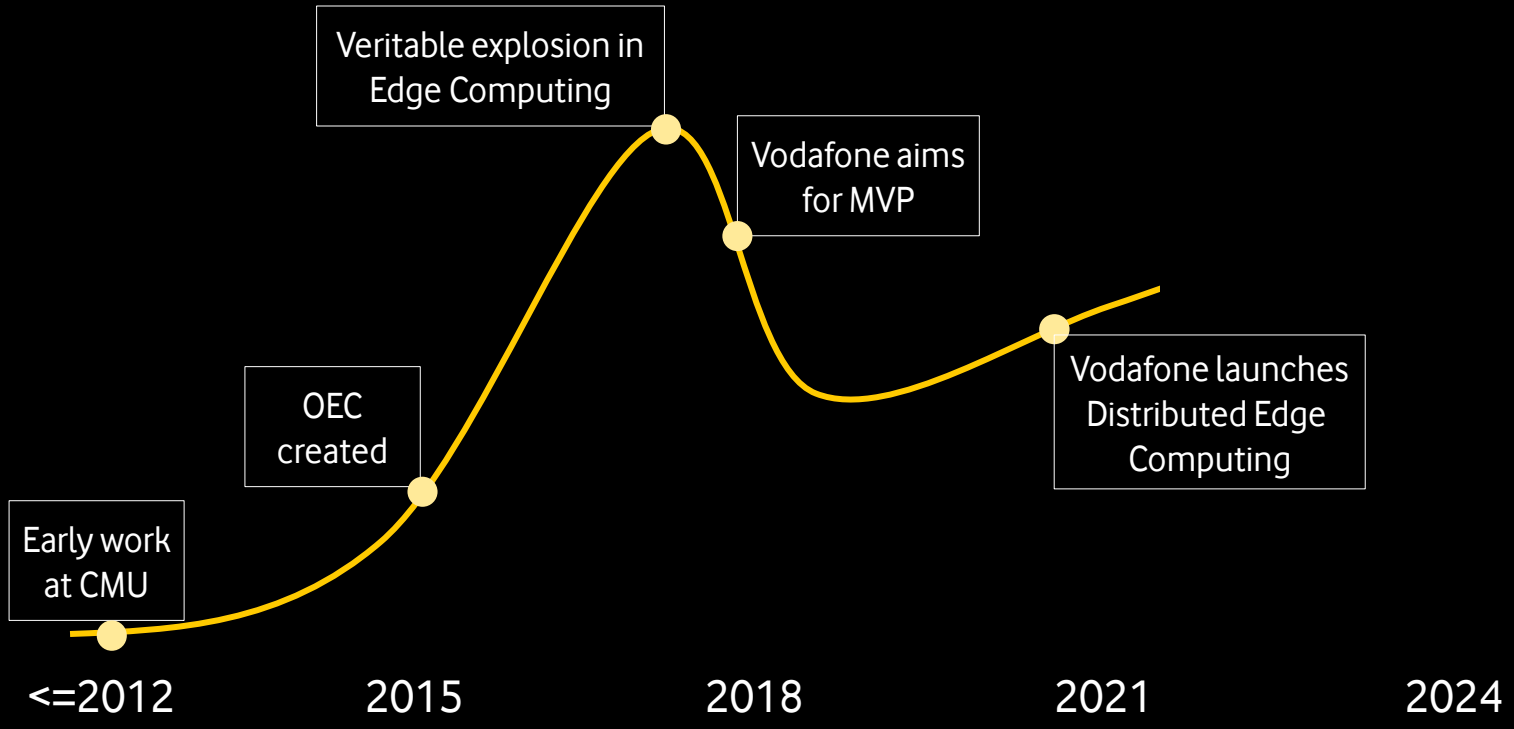


Most remarkable demonstrations by CMU from early days of OEC

Automated guidance through smart glasses (Prof. Satya's team)



Since 2016: Ups and downs ... and perseverance



2017: Worked on Field of View rendering at the network edge

Vodafone and HUAWEI

VR is on the Edge: How to Deliver 360° Videos in Mobile Networks

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Marco Dias Silva
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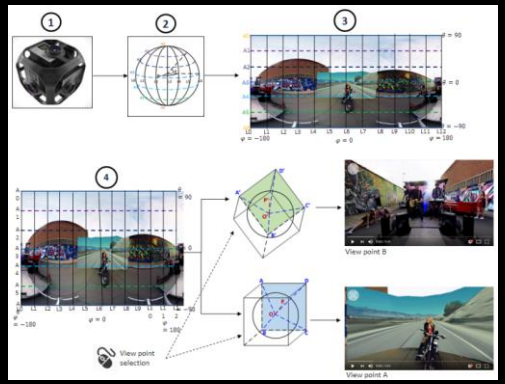
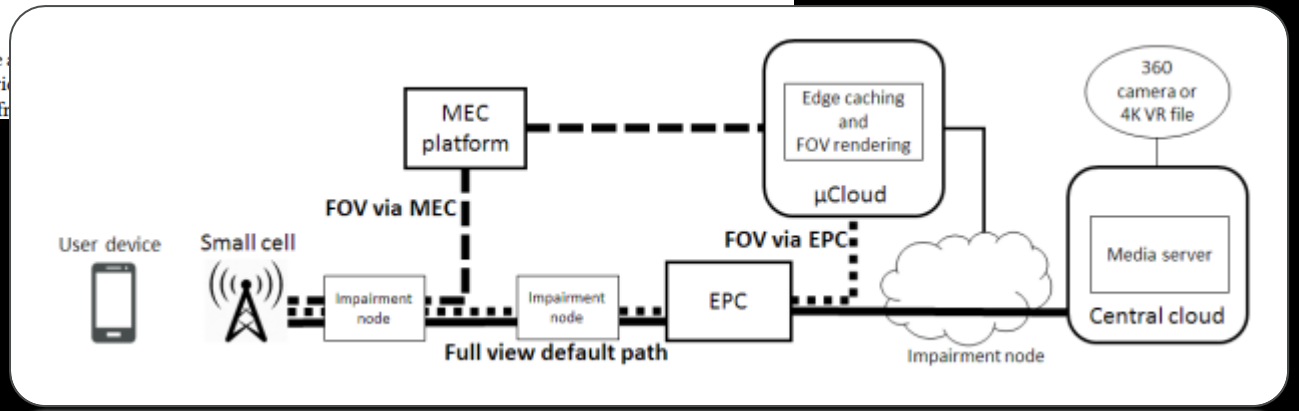
ABSTRACT

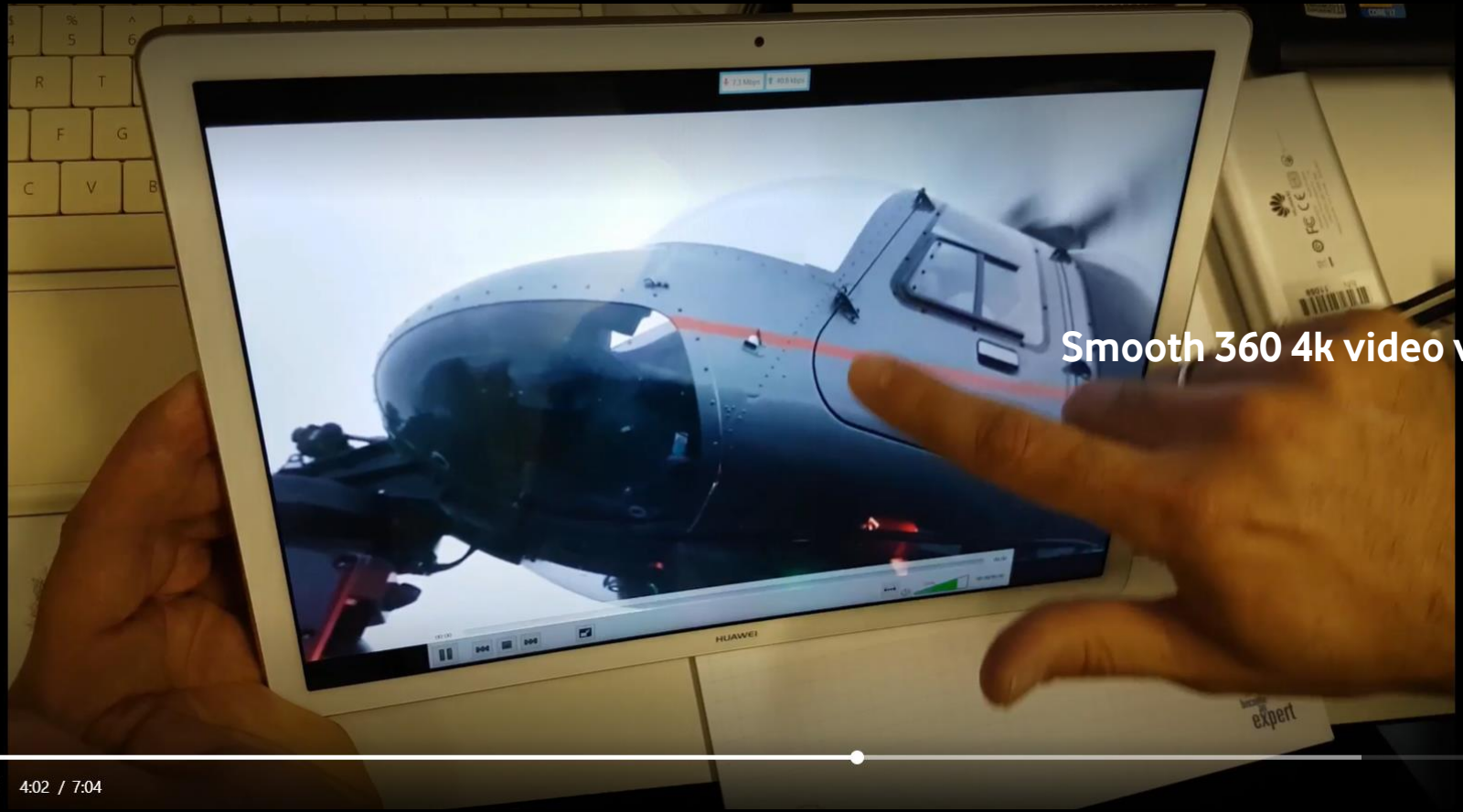
VR/AR is rapidly progressing towards enterprise
with the promise of bringing immersive experi
applications. Soon it will target smartphones fr





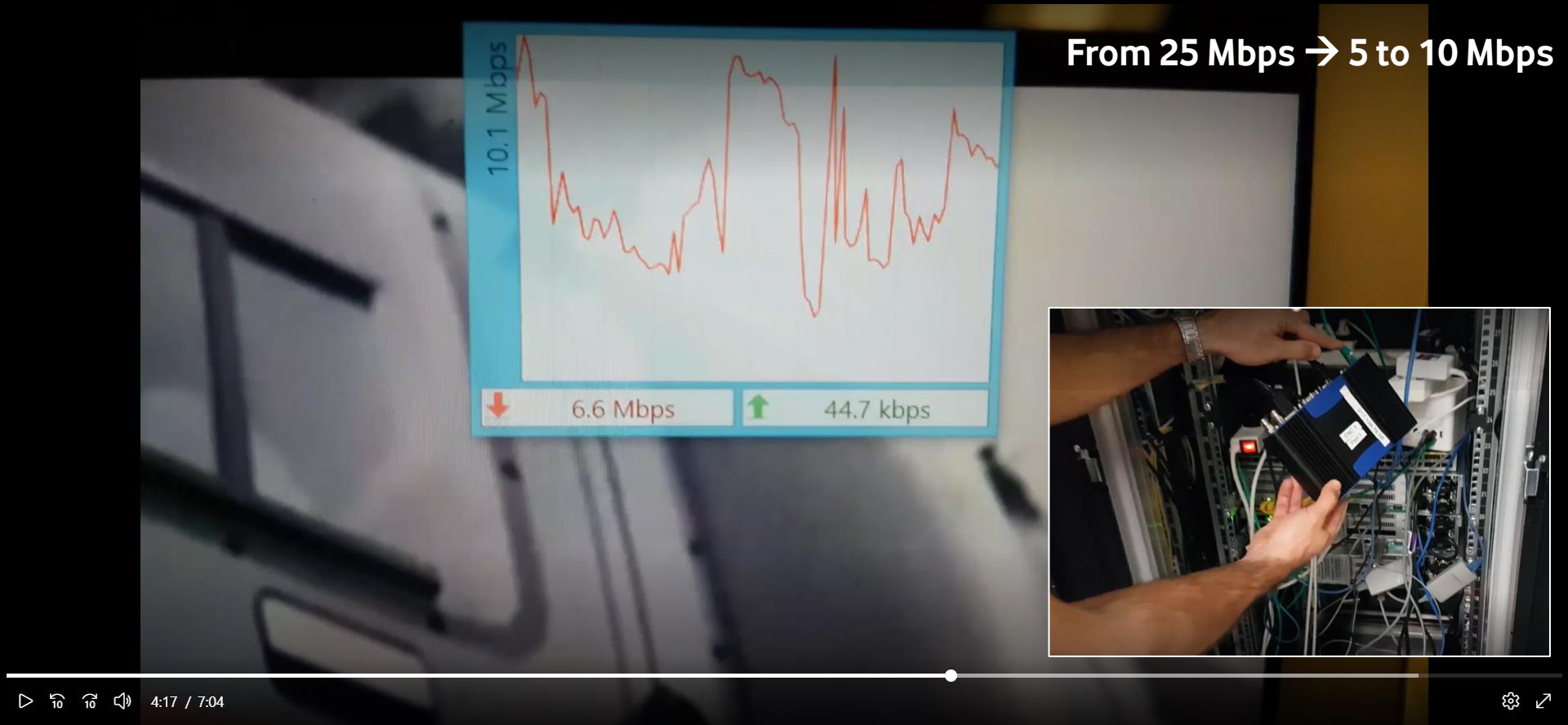
2017: Worked on Field of View rendering at the network edge

Vodafone and HUAWEI



2017: Worked on Field of View rendering at the network edge

Vodafone and HUAWEI



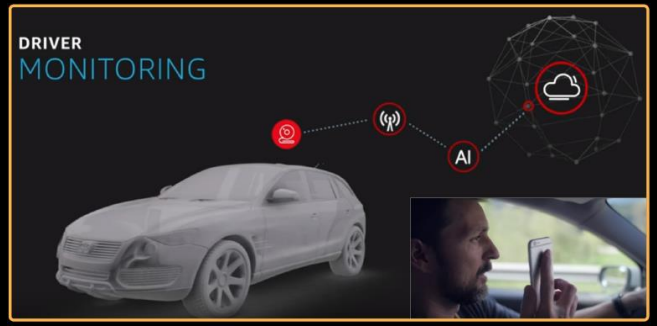
2017 May: Went for broadcasting about Edge Computing in Vodafone

2017 May: Prof. Satya taking questions from world-wide Vodafone audience

2018 Mobile World Congress: Edge computing for driver monitoring

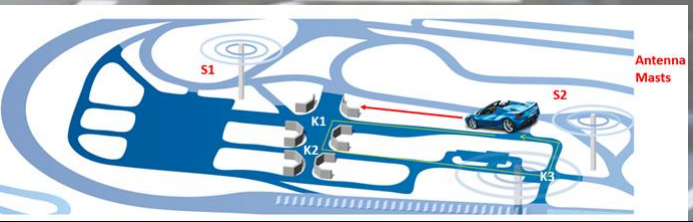
Vodafone, Saguna, Amazon AWS

https://www.youtube.com/watch?v=N_UXawm6KGs



2019 Mobile World Congress: Deep Learning at the Edge

Vodafone and Continental with Saguna, Juniper and Netrounds



- Sophisticated AI
- Testing of impact of
  - vehicle speed,
  - radio handover

2020: Covid-19 hit us, but we carried on – Seamless Edge Cloud Handover

Vodafone, ERICSSON and TOYOTA

"Automotive Trials for Make-Before-Break 5G Edge Cloud Handover" webinar organised by 5G PPP Automotive Group

July 13, 2020 @ 12:00 pm - 1:00 pm CEST

Toyota, Vodafone and Ericsson jointly conducted Edge Computing trials at the Aldenhoven Testing Center in 2020. Goal was to get more insight on two research questions: Do file download- / upload-based applications, like for example HD Mapping, benefit from Edge Computing and what advantage will Make-Before-Break gateway switching (aka Session and Service Continuity (SSC) mode 3), provided by 5G Core, bring?

https://5g-ppp.eu/wp-content/uploads/2020/07/Maciej-Keynote-CLEEN-Workshop-Published.pdf

https://6g-ia.eu/event/automotive-trials-for-make-before-break-5g-edge-cloud-handover-webinar-organised-by-5g-ppp-automotive-group/

2021: Commercial launch

Business needs | Products & solutions | Case studies | News & insights | About

Vodafone Business Distributed Edge Computing with AWS Wavelength Launch Event

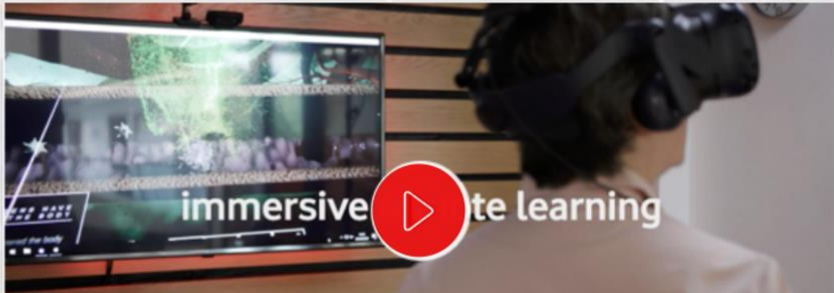
16 June 2021 3pm – 4pm (BST)

Vodafone Business Home > News & insights > Events & Webinars

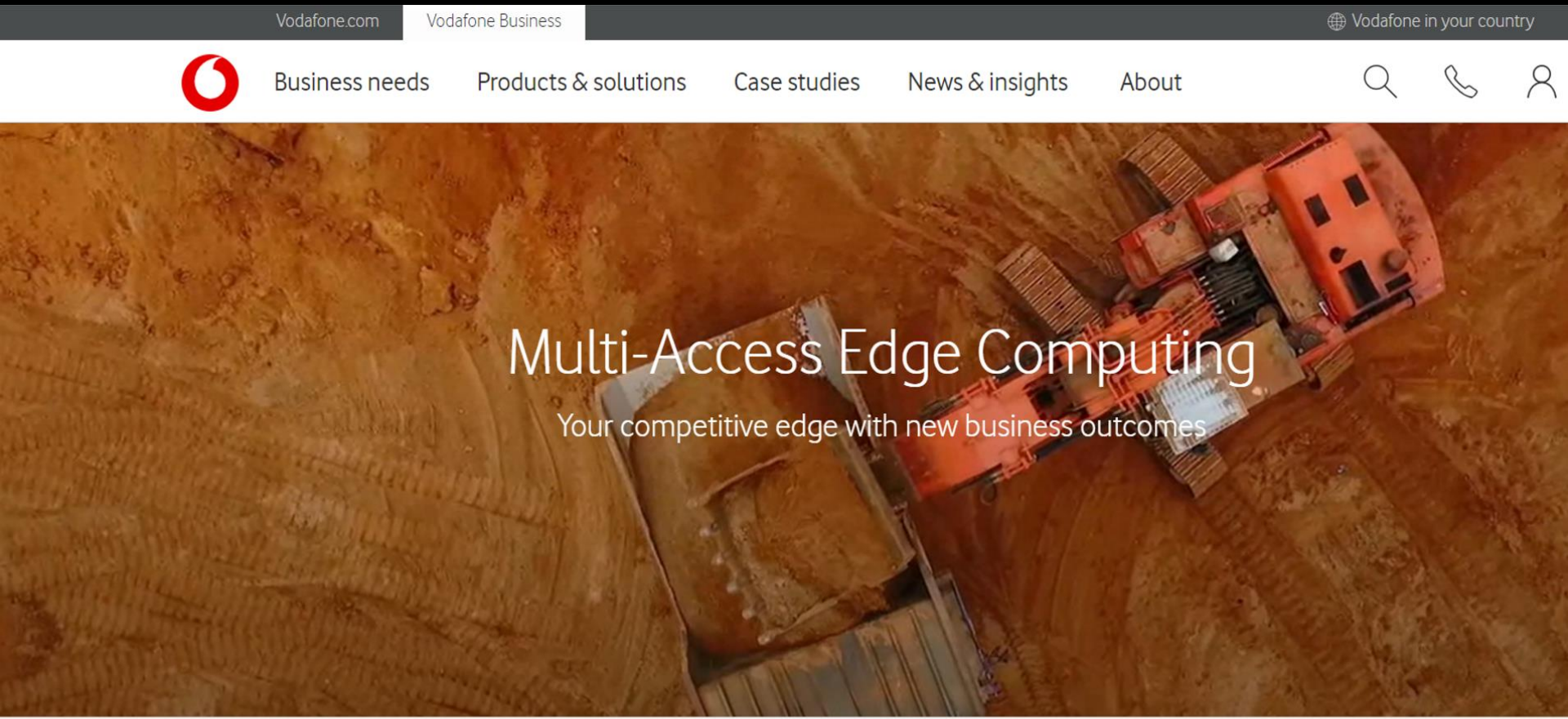
#EdgeComputing #5G

Sign up to attend our free online event and hear how the UK launch of Distributed Edge Computing with AWS Wavelength will drive a new wave of innovation and transformation.

Register now



Edge computing has become a business proposition



Take-up by application developers requires more business development

Business needs | Products & solutions | Case studies | News & insights | About

Register Share

Revolutionising the way we live, work and play

We're bringing the cloud closer to the devices that need it. Placing decision-making at the edge of our network means ultra-fast speeds and real-time insights. This unlocks incredible new possibilities and gives you the edge to redefine the future.

Example use cases explored on Vodafone edge computing infrastructure

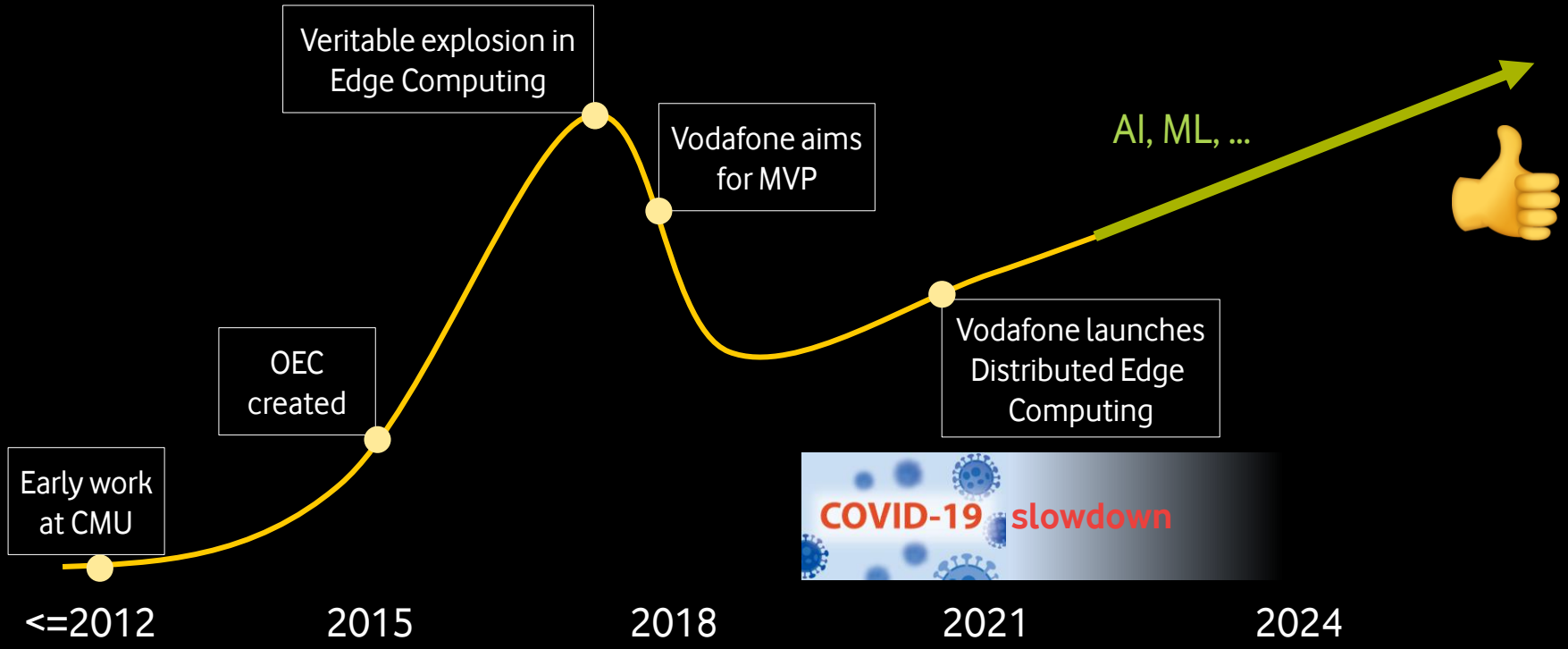
Auriggo

Sportable

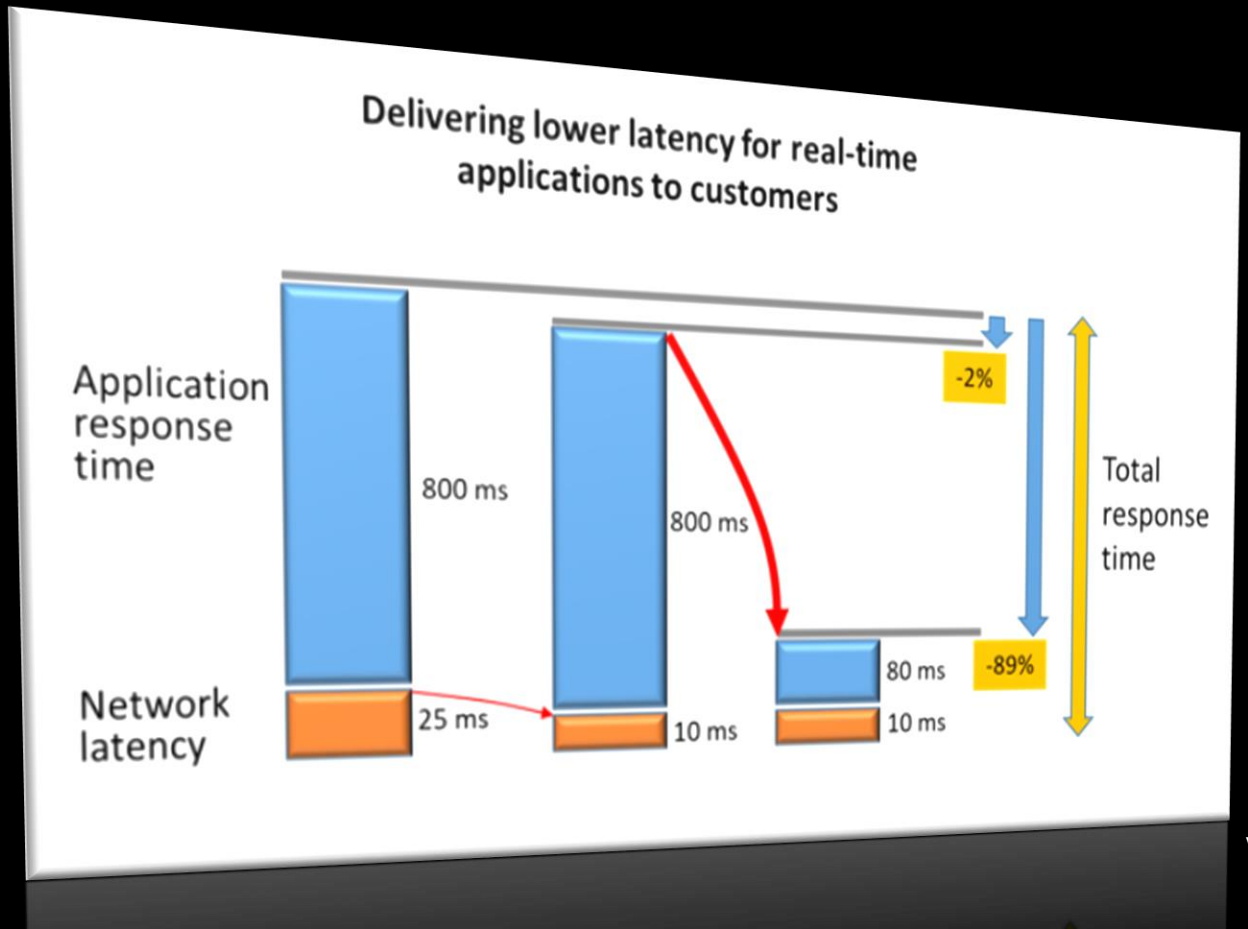
Dedrone

Xpllore

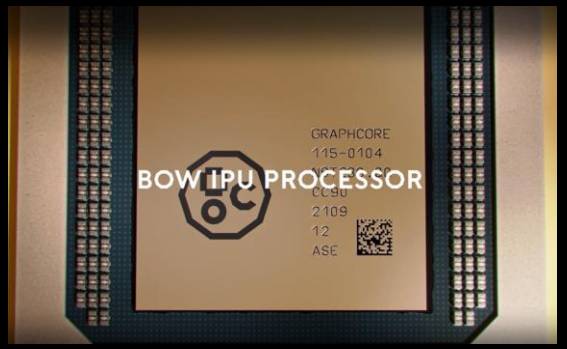
More needs to be done by industry to propel edge computing forward



An example of things to fix: Obsession with network latency only



New types of hardware acceleration to speed up application runtime.
Example: graphcore.ai



GRAPHCORE

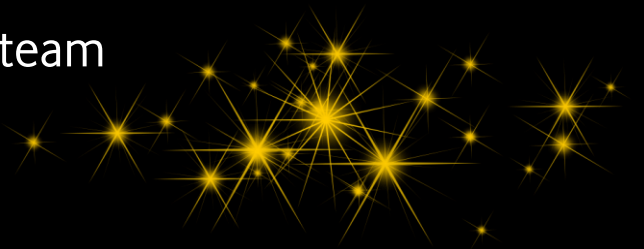
Vodafone has measured promising results

In which ways has OEC been unique?

- Inspired by academic research and bold vision
- Fuelled by early prototype applications from Prof. Satya's team
- Associated lab
- Core group of committed and like-minded participants
- Unique combination of academic and industry partnership

How has OEC made a difference?

- We got much inspired by its participants!
- We got spurred on by research results from Prof. Satya's team
  - Papers
  - Open source code
- We benefited from diversity and freshness of thinking in OEC



Special thanks to Prof. Satya, Rolf and of course to the other members of OEC. It has been a great journey!

Together we can