

Understanding mobile service usage for MEC placement, scaling, and migration

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Friday group meeting

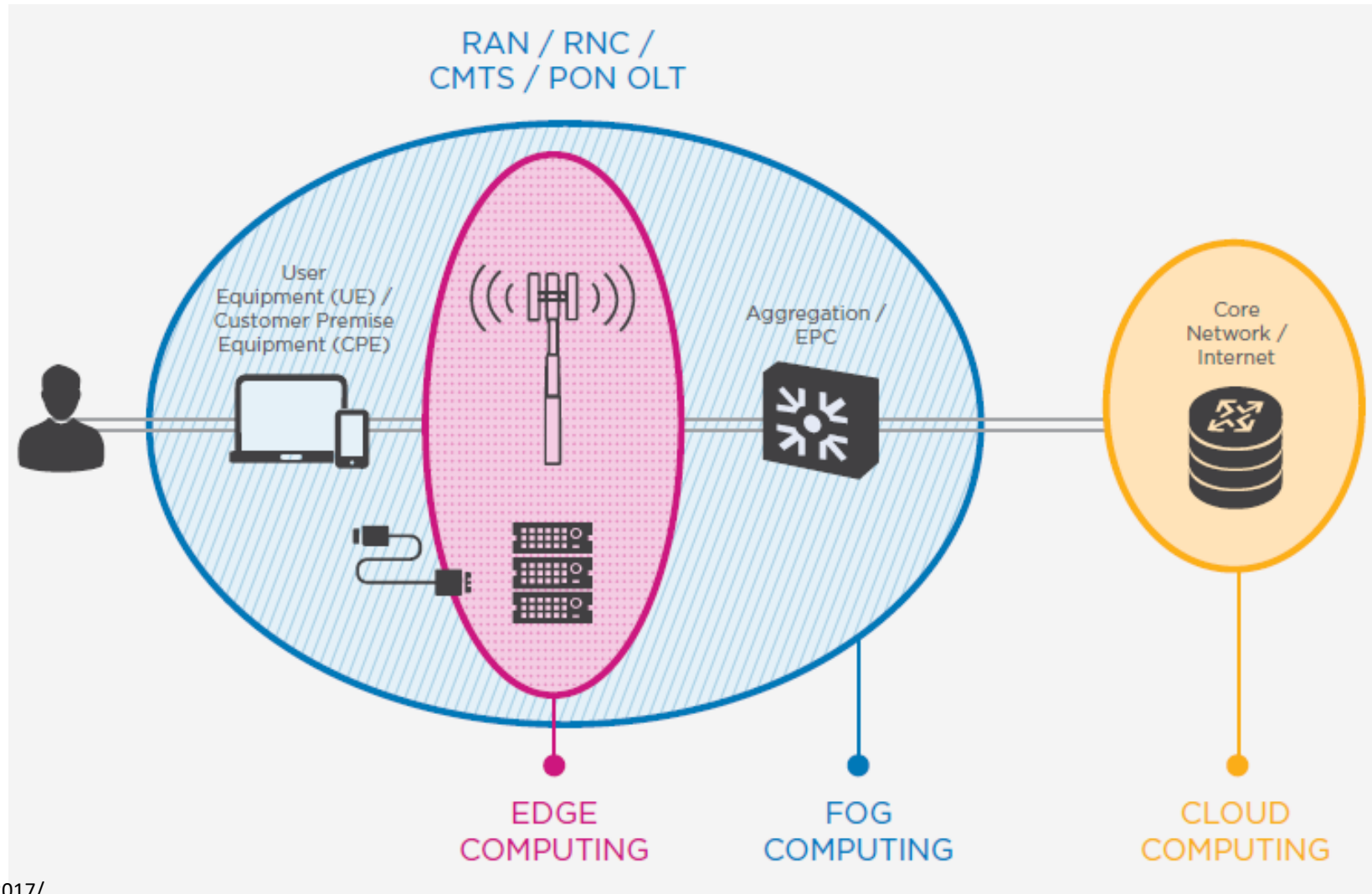
Netlab, UC Davis

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Definition of MEC

- Multi-access Edge Computing (MEC), or simply edge computing, is the application of cloud architecture principles to compute, storage and networking infrastructure close to the user, at the edge of a network.
- Edge computing is typically located at the access point, *one hop away from the user*.
- Fog computing is a superset of edge computing, and *essentially includes everything that is not a cloud*.

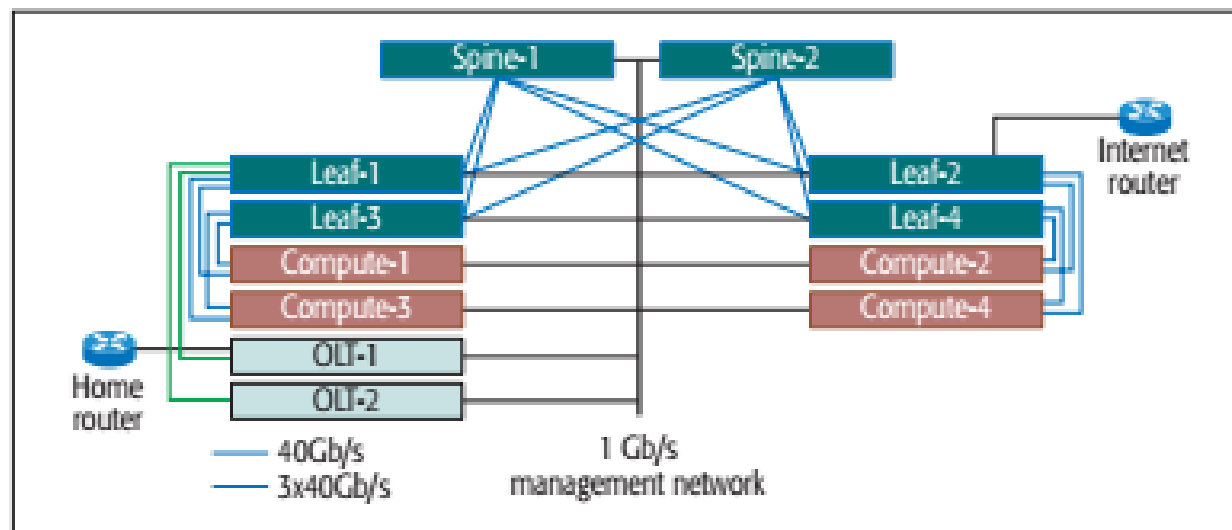
Radio Area Network (RAN) for LTE/5G
Radio Network Controller (RNC) for WiFi
Cable Modem Termination System (CMTS) for cable
PON OLT for fiber



Architecture of MEC system



Central office re-architected as a data center



L. Peterson, A. Al-Shabibi, T. Anshutz, S. Baker, A. Bavier, S. Das, J. Hart, G. Palukar, and W. Snow. "Central office re-architected as a data center," *IEEE Commun. Magazine*, vol. 54, no. 10, pp. 96-101, Oct. 2016

Virtual Machine Management

- Placement
- Migration
- Scale in/out, up/down
- Service chaining

How does the usage look like?

- Universidad Carlos III Madrid and Orange Labs studies 3G/4G mobile network deployed over a major European country.
- Somehow surprisingly, almost all considered services exhibit quite different temporal usage
- In contrast to such temporal behavior, spatial patterns are fairly uniform across all services
- When looking at usage patterns at different locations, the average traffic volume per user is dependent on the urbanization level
- This findings not only have sociological implications, but are also relevant to the orchestration of network resources

Which service at what time?

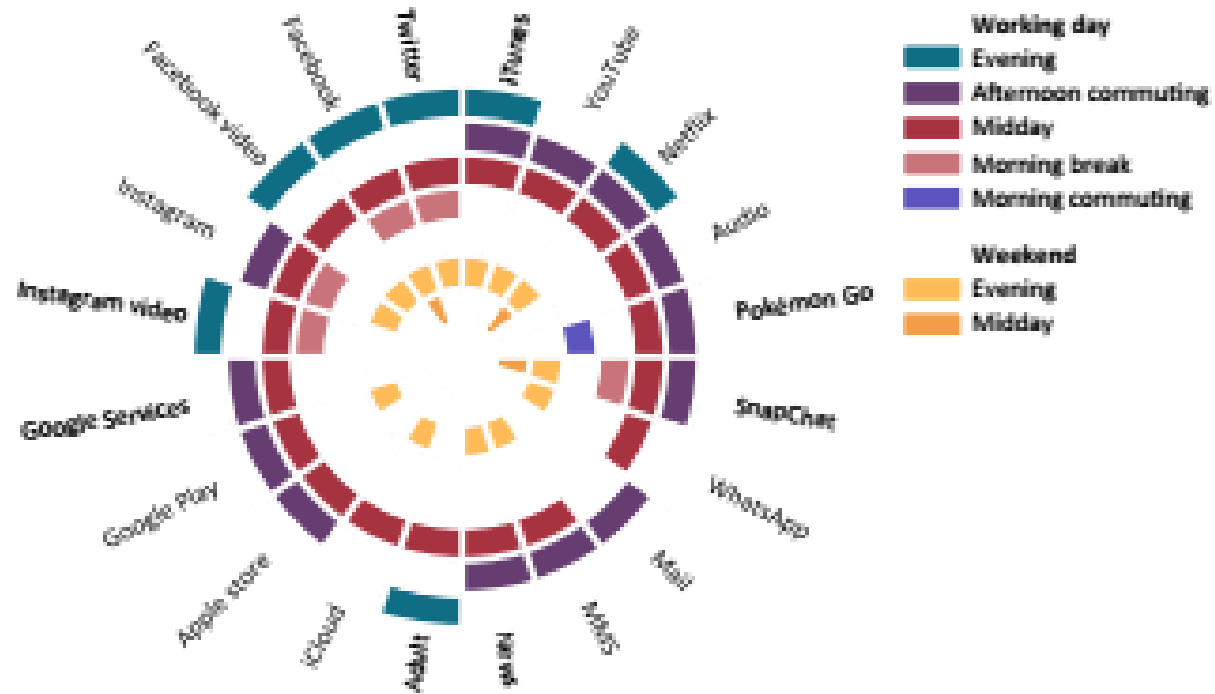


Figure 6: Activity peak times of mobile services.

Research idea

- In future, user applications, contents, and data are going to control what applications we need to place, scale and migrate at MEC.
- MEC placement, scale, migration decisions should have a clear understanding of such user patterns and behaviors (instead of simply following some greedy objective such as: lower cost)
- This would also allow network to be prepared ahead of time: how much resources to place, where to place? What kind of resources (e.g. applications, functions, compute, storage)?

Thanks!