

Area 3: Resource Management and Orchestration

Cicek Cavdar

cavdar@kth.se



Agenda:

Time	Topic	Presenter/affiliation
9:00-9:20	Overview of RA3	Cicek Cavdar/KTH
9:20 -9:40	RISE presentation: GEMINI: Generalized & Explainable 6G Mobile Intelligence	Hassan Shabir/RISE
9:40-10:00	KTH presentation: (20 min) •Cell-free networks with cloud-native network orchestration	Ozan Alp Topal /KTH
10:00-10:20	Coffee Break	
10:20-11:20	KTH presentation: (60 min) •AI-assisted green cell-free network management •Scalable Antenna and Clustering Control in O-RAN Cell-Free Massive MIMO • Cell-free ISAC for Drone Detection Considering Coverage and Age of Sensing	Qichen Wang/KTH Yunquan Chen/KTh Zinat Behdad/ KTH
11:20-11:40	Ericsson presentation: (20 min) •6G and autonomous networks	Erik Dahlman & Peter Öhlén / Ericsson
11:40-12:00	Collaboration between partners (20 min)	All
12:00-13:00	Lunch at Taste (hosted by KTH)	

Overview of RA3

Vision: AI and Cloud-Native Cell-Free Green Mobile Networks

- **Support heterogeneous services** with diverse communication, localization, sensing, and latency requirements.
- **Jointly orchestrate radio, transport, and cloud resources** across geographically distributed processing units.
- **Use AI-driven automation** for traffic prediction, dynamic slicing, risk analysis, self-healing, and adaptive resource allocation.
- **Balance reliability, performance, and energy efficiency** by dynamically activating energy-saving features without compromising service quality.

Long-term vision:

Move from manually configured 5G networks toward **autonomous, adaptive, and parameter-free networks** that learn from the environment and reconfigure resources according to changing service demands.

Long-Term Research Plan

1- Risk-Aware, Data-Driven Green Network Management

(KTH, RISE, Ericsson, SAAB)

- AI-assisted and zero-touch network management
- Dynamic resource reconfiguration and energy-saving features
- Risk-aware operation with reliability guarantees
- Real and synthetic network data for learning and evaluation

2- From Cell-Centric to User-Centric Networks

(KTH, RISE, Ericsson, SAAB)

- Cloud-native and cell-free network orchestration
- Dynamic user-centric clustering of distributed radio units
- Joint orchestration of **radio, transport, and cloud resources**
- Support for communication, sensing, and localization with minimum resource usage

3- 3D Network Management & Orchestration

(KTH, SAAB, RISE)

- Reliable communication, localization, and sensing for aerial and mobile users
- UAVs as **users, base stations, and sensors**
- Resilient decentralized and private networks for challenging connectivity scenarios
- Integration of terrestrial, satellite, and UAV networks

Progress on activities planned for 2026

- **Dynamic and risk-aware resource orchestration for cell-free massive MIMO networks implemented over O-RAN architectures**
 - 1 published conference paper (IEEE ICC) and 1 journal (to be submitted)
 - Q. Wang, et. al, "Energy Saving for Cell-Free Massive MIMO Networks: A Multi-Agent Deep Reinforcement Learning Approach," *ICC 2026 - IEEE International Conference on Communications*, Glasgow, United Kingdom, 2026, pp. 1-6, doi: 10.1109/ICC59461.2026.11587903.
- **Joint resource allocation for a cell-free massive MIMO network**
 - 2 published conference papers
 - [1] Joint Access and Fronthaul Resource Allocation for Cell-Free Massive MIMO with Wireless Fronthaul, Ozan Alp Topal, Özlem Tuğfe Demir, Emil Björnson, and Cicek Cavdar. In *IEEE Workshop on Signal Processing and Artificial Intelligence for Wireless Communications*, 2026
 - [2] Rethinking Energy Efficiency in Cell-Free Massive MIMO: The Role of Processing and Optical Fronthaul, Ozan Alp Topal, Özlem Tuğfe Demir, and Cicek Cavdar. In *International Conference on Transparent Optical Networks*, 2026

Progress on activities planned for 2026

- **Joint resource allocation including radio, fronthaul, and cloud resources for ISAC in CF-mMIMO networks**
 - 1 journal paper to be submitted
- **ISAC-assisted drone detection/positioning and tracking**
 - Z. Behdad, et. al, "Cell-free ISAC for Drone Detection Considering Coverage and Age of Sensing," *2025 59th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, USA, 2025, pp. 1644-1649, doi: 10.1109/IEEECONF67917.2025.11443754.
 - Extension of the work
- **UAV-assisted target detection in a cell-free massive MIMO network consisting of multiple UAVs serving as areal APs**
- **Practical challenges in ISAC (KTH and Ericsson)**
 - 1 Magazine paper to be submitted

RA3 shared folder

- [SweWIN-WP3](#)
- [SweWIN 2026 Research Plans.docx](#)
- [Presentations](#)
- [Meeting Notes and agenda](#)

Email List

KTH:

Cicek Cavdar cavdar@kth.se

Anass Sedrati anass@kth.se

Zinat Behdad zinatb@kth.se

Ozan Alp Topal oatopal@kth.se

Satya Seeram sssgse@kth.se

Irshad Ahmad Meer iameer@kth.se

Zhenyu Li zhenyuli@kth.se

Qichen Wang qichenw@kth.se

Pernilla Johansson Schuber <pjs@kth.se>

Nasir Khan <nkha@kth.se>

Ericsson:

Johan Söder johan.soder@ericsson.com

Erik Dahlman erik.dahlman@ericsson.com

Peter Öhlén peter.ohlen@ericsson.com

Patrick Sellstedt patrick.sellstedt@ericsson.com

Pål Frenger pal.frenger@ericsson.com

Aleksejs Udalcovs aleksejs.udalcovs@ericsson.com

SAAB:

Anders Silander anders.silander@saabgroup.com

Urban Bilstrup urban.bilstrup1@saabgroup.com

David Wilkins david.wilkins@saabgroup.com

RISE:

Anders Lindgren anders.lindgren@ri.se

Hassan Shabir hassan.shabir@ri.se

Collaborations

- **1- Risk-Aware, Data-Driven Green Network Management**
(KTH, RISE, Ericsson, SAAB)

?

- **2- From Cell-Centric to User-Centric Networks**
(KTH, RISE, Ericsson, SAAB)

?

- **3- 3D Network Management & Orchestration**
(KTH, SAAB, RISE)

?