Celtic-Plus
Smart Connected World

EUREKA

Celtic-Plus Proposers Day
20th June 2017, Helsinki

Machine learning and big data analytics (for spatial and temporal demand shaping) in wireless communications (5G and beyond)

Dr. SERDAR ÖZEN, HAVELSAN,
Technology and Academy Directorate, Ankara, TURKEY
sozen@havelsan.com.tr

HAVELSAN®

Teaser

The idea:

For heterogenous networks (HetNets): utilize and take advantage of the

1. Machine/deep learning and
2. Big data analytic tools

that have been developed during the last decade and use them to add

- more cognitive/learning ability in the system,
- well informed user centric decisions/optimizations,
- self evolution/adaptation capability,

and apply them to HetNets for 5G and beyond wireless systems.

If you are an algorithm/SW/system developer for wireless communications, and would like to get ahead by adding value to the existing solutions by using deep learning algorithms/AI/data analytics tools, this project may be a good opportunity.

HAVELSAN, Turkey

LEADING INFORMATION TECHNOLOGY, INTELLIGENT SYSTEMS TECHOLOGY DEVELOPER, and SYSTEMS INTEGRATOR IN DEFENSE, SECURITY & CIVILIAN TECHNOLOGY MARKETS

TURKISH ARMED FORCES FOUNDATION

COMMAND, CONTROL & COMBAT SYSTEMS: Leader of Turkey

TRAINING & SIMULATION TECHNOLOGIES
A Global Brand in Training & Simulation

MANAGEMENT INFORMATION SYSTEMS
Leading E-Transformation Company of Turkey

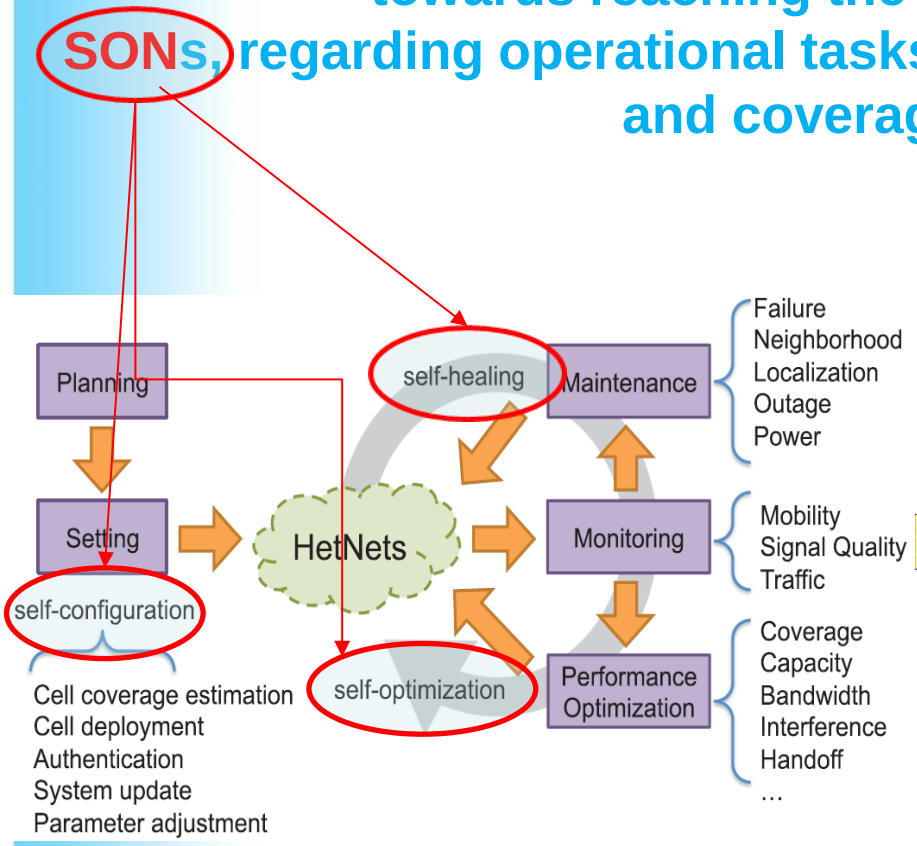
HOMELAND & CYBER SECURITY
Center of Excellence in Security Solutions

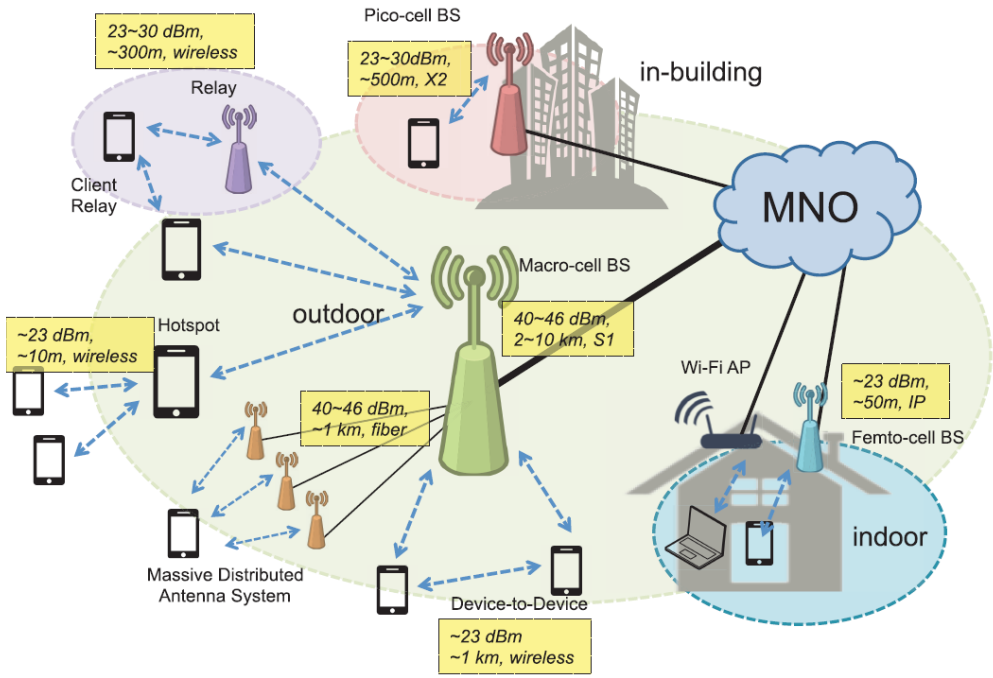
Personnel: ~1380
85% Electrical & Computer Engineers
~40M Euros of R&D Budget

Proposal Introduction (1)

Machine learning and big data analytics for wireless communications (Het-Nets/5G+)

In order to reduce the O/CAPEX of MNO's, Machine Learning/AI/Data analytic techniques can substantially diminish human involvement in HetNets towards reaching the advanced concepts of SONs, regarding operational tasks, and optimizing network capacity and coverage, and QoS.

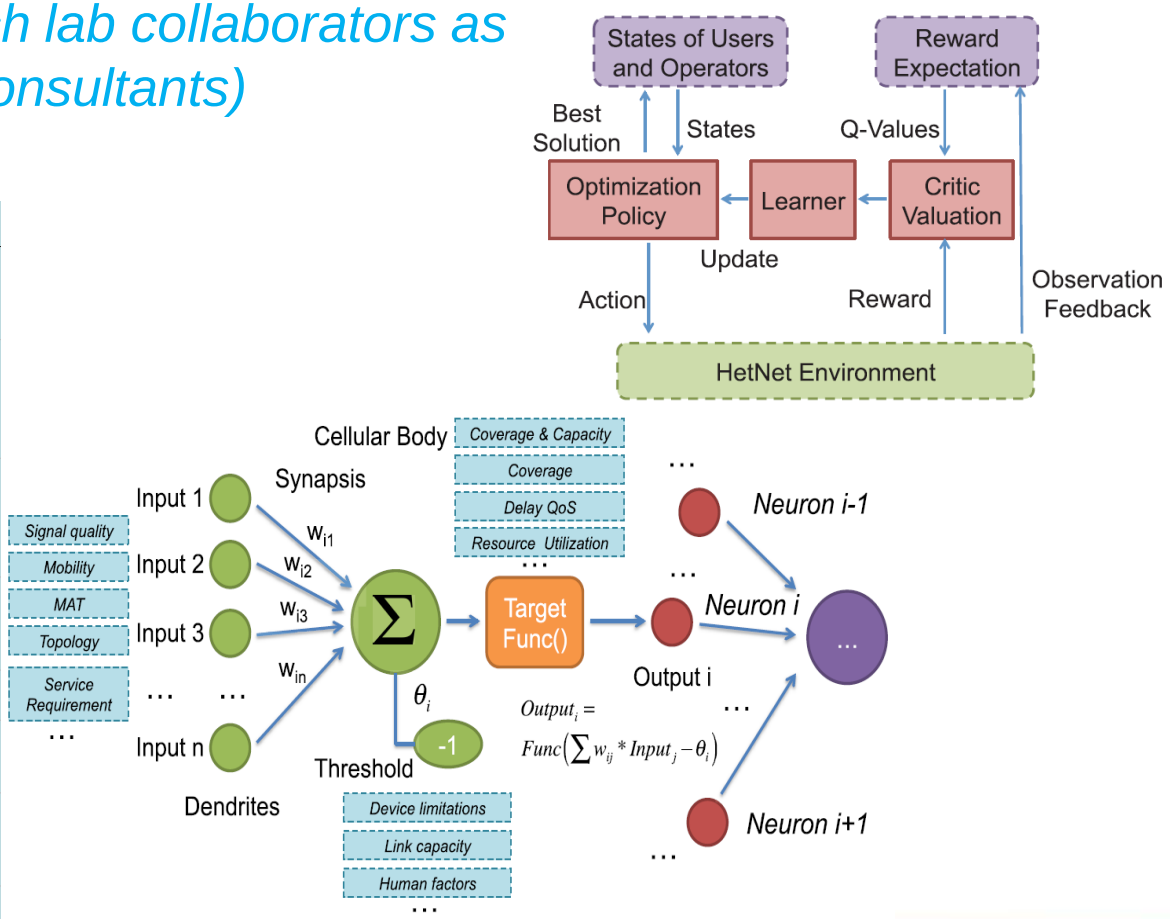




Proposal Introduction (2)

- *Different scenarios for establishing these learning algorithms for a SON as an SDN concept can be implemented.*
- *30-36 months of Schedule with 6-10 partners (possibly with universty/research lab collaborators as subcontractors/consultants)*

Subjects	Models/algorithms	Example wireless applications
Statistical modeling	Markov models, time series, geometric models, Kalman filters	Mobility prediction, resource provision, device association/handoff prediction
Data mining	Pattern matching, text compression, clustering, dimension reduction	Mobility prediction, social group clustering, context-aware processing, cache management, user profile management
Machine learning	Classification algorithms, neural network, regression analysis	Context identification, traffic prediction, fitting trajectory length, user location and the channel holding time
	Dimension reduction algorithms: PCA, PARAFAC, Tucker3	User data compression/storage, traffic feature extraction, blind multiuser detection
	Q-learning	Handoff and admission controls
	Primal/dual decomposition, ADMM	Distributed routing/rate control and wireless resource allocation
	Online convex optimization, stochastic learning	Online mobility predictions, handoffs, and resource provi-sioning
	Active learning, deep learning	Incomplete/complex mobile data processing



Partners

- *Currently we are working with Carleton University, Ottawa, Canada.*

- *We need at least 5-6 algorithm and software development partners;*
- *At least 1 mobile network operator, possibly 2.*

- *Here is another Project Proposal Topic to be investigated:*

  - *Drone/UAV/aerial Base Stations and low-altitude/medium-altitude/high-altitude platforms (LAPs/MAPs/HAPs) for Wireless Base Stations to maximize coverage for users with different QoS requirements.*

Contact Info

For more information and for interest to participate please contact:

Name and affiliation: Dr. Serdar Özen
E-Mail: sozen@havelsan.com.tr
Telephone: +905323355287

HAVELSAN A.Ş.
Ankara, Turkey
http://www.havelsan.com.tr