a glimpse into
Wireless Mesh Networks

University of Victoria — PANDA — Parallel, Networking and Distributed Applications
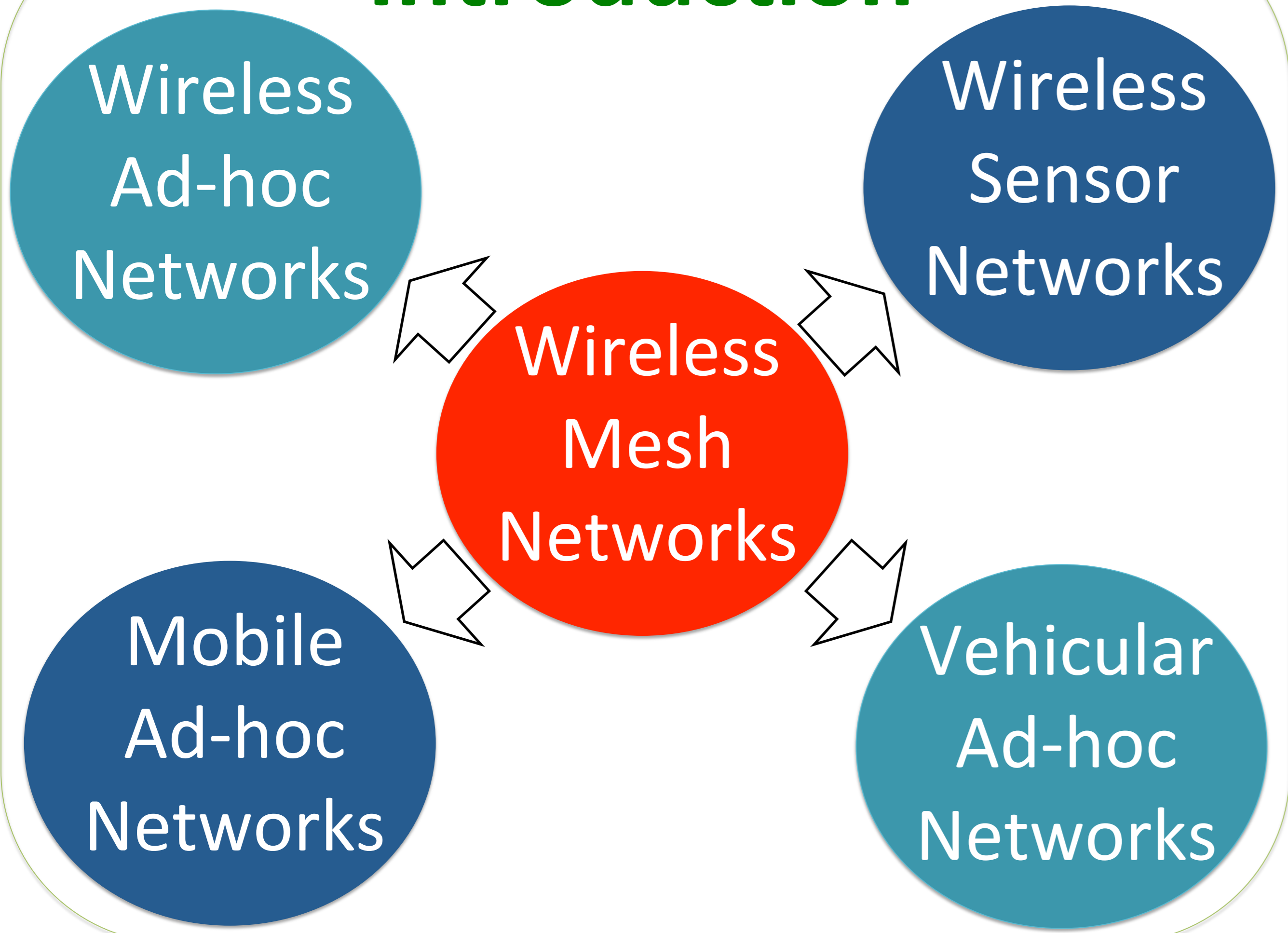
S.Dawood Sajjadi (sajjadi@uvic.ca), Department of Computer Science, University of Victoria, BC, Canada
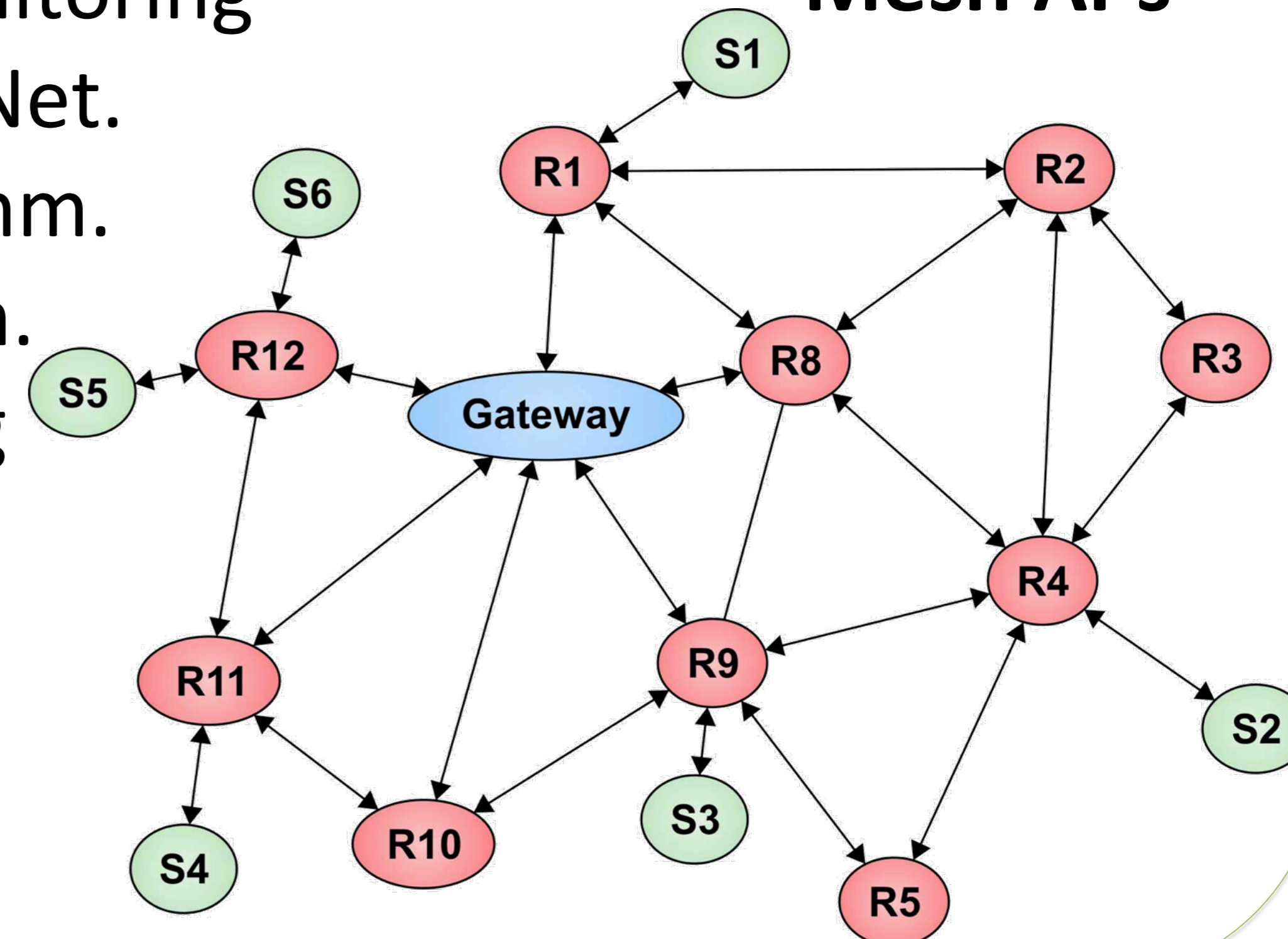
Introduction

- Wireless Ad-hoc Networks
- Wireless Sensor Networks
- Wireless Mesh Networks
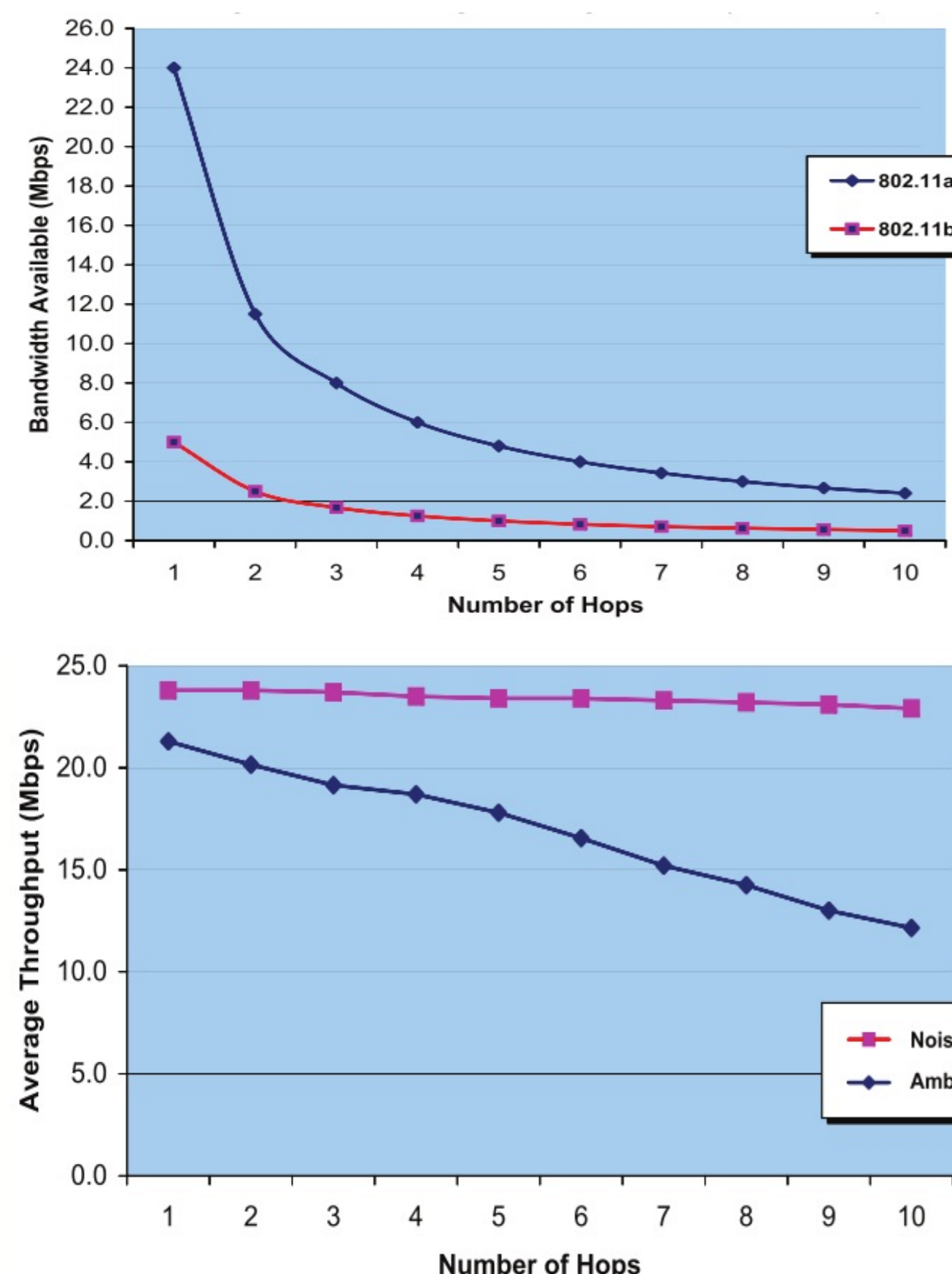- Mobile Ad-hoc Networks
- Vehicular Ad-hoc Networks

Applications

- Broadband Wireless Access
- Environmental Monitoring
- Multimedia Home Net.
- Transportation Comm.
- Public Safety Comm.
- Medical Monitoring
- Video Surveillance
- Temporary Net.
- Military Comm.

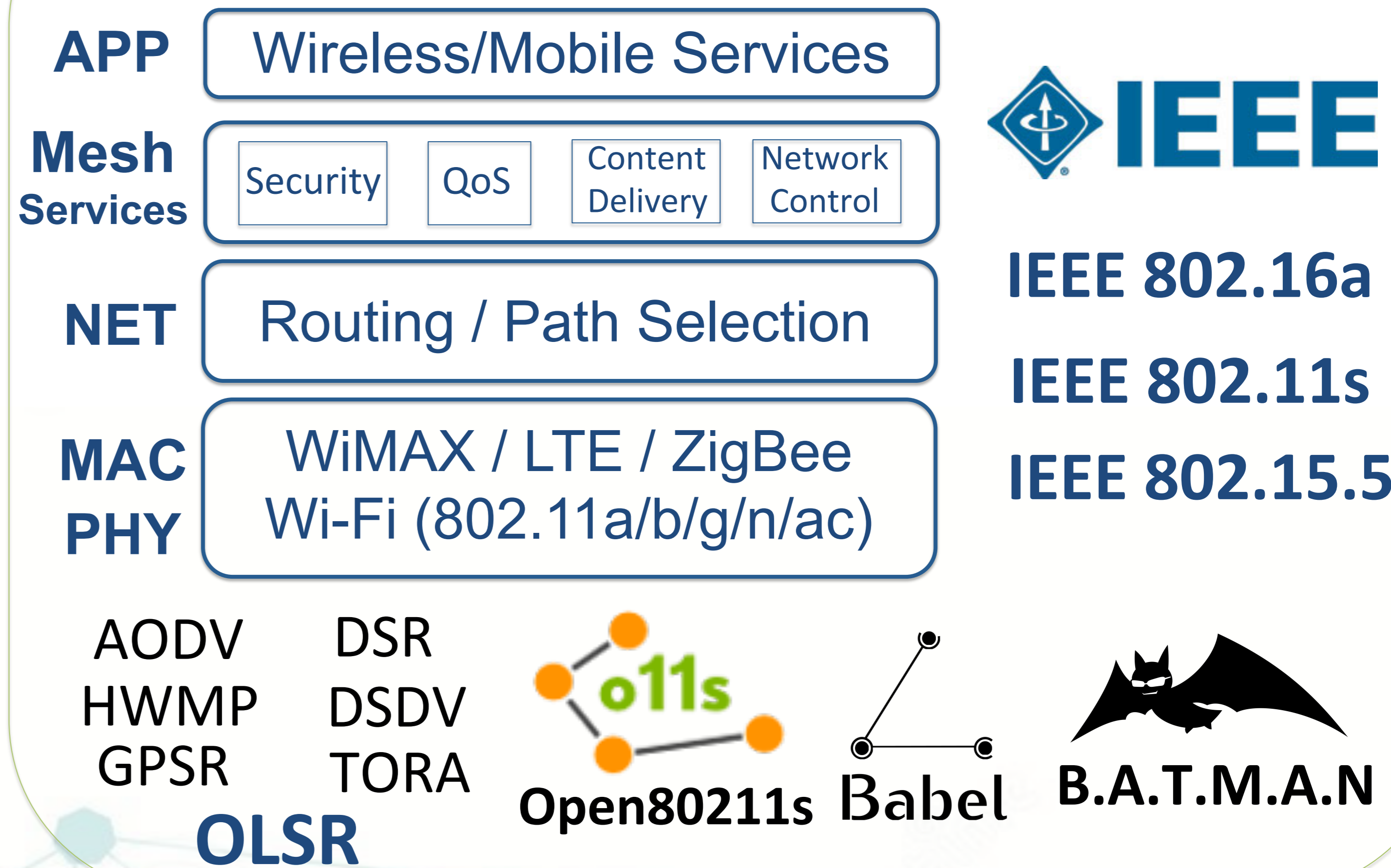**Mesh Gateways Mesh Routers Mesh APs**
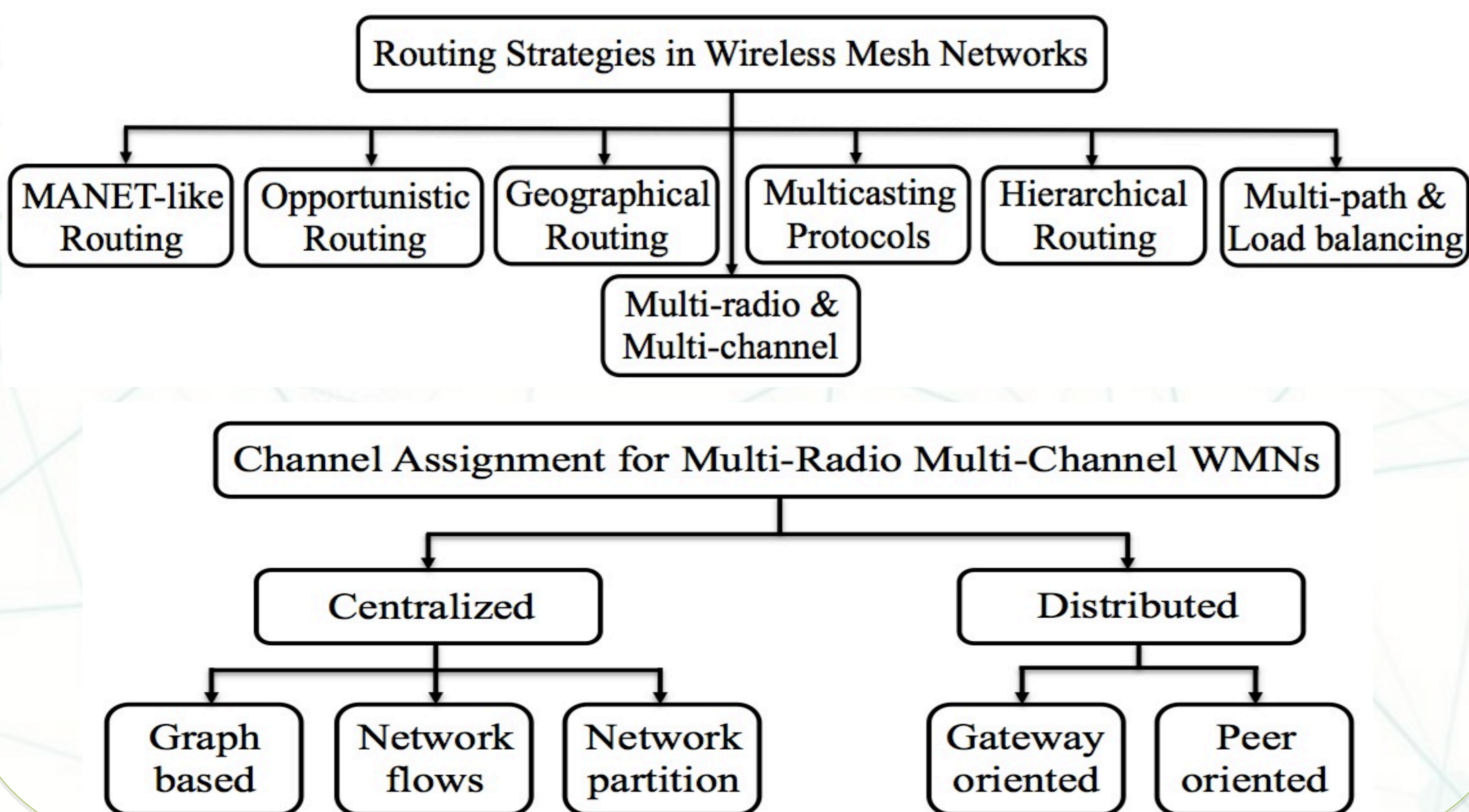

Challenges

- Throughput degradation
  - ✓ Single vs. Multi radios
  - ✓ PHY & MAC features
- Channel Assignment
  - ✓ Interference control
  - ✓ Power leakage
- QoS & Fairness
  - ✓ Bandwidth guarantee
  - ✓ Delay/Jitter control
- Scalability
  - ✓ Multi-hop networks
  - ✓ Topology control
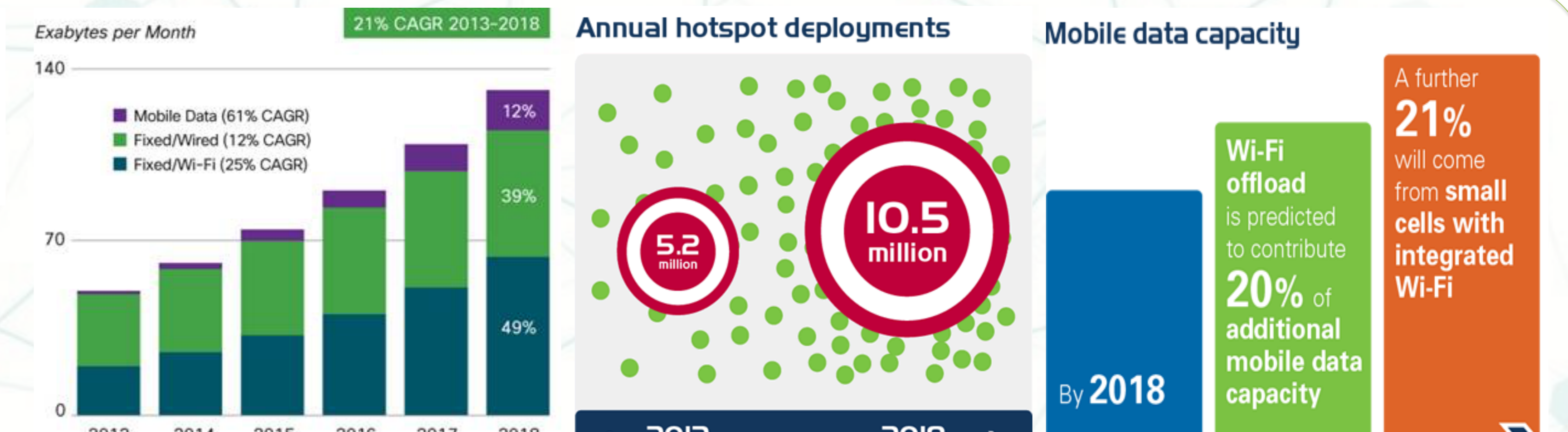
Architecture & Protocols

APP	Wireless/Mobile Services
Mesh Services	Security / QoS / Content Delivery / Network Control
NET	Routing / Path Selection
MAC PHY	WiMAX / LTE / ZigBee Wi-Fi (802.11a/b/g/n/ac)

IEEE

IEEE 802.16a
IEEE 802.11s
IEEE 802.15.5

AODV   DSR
HWMP   DSDV
GPSR   TORA
OLSR

Open80211s   Babel   B.A.T.M.A.N

Routing & Channel Assignment

Routing Strategies in Wireless Mesh Networks
- MANET-like Routing
- Opportunistic Routing
- Geographical Routing
- Multicasting Protocols
- Hierarchical Routing
- Multi-path & Load balancing
- Multi-radio & Multi-channel

Channel Assignment for Multi-Radio Multi-Channel WMNs
- Centralized
  - Graph based
  - Network flows
  - Network partition
- Distributed
  - Gateway oriented
  - Peer oriented

Key Research Projects

MIT Roofnet
SMesh
mesh-wise
VillageTelco
SolarMesh
CARMEN — Carrier grade Mesh Networks
openmesh
WING — WMN for NG-Internet
RuralNet — 802.11-based Low-cost Networking for Rural India

WMN in Industry

aruba NETWORKS
CISCO
TROPOS networks — GREENER, SAFER, SMARTER

Reference

S.D. Sajjadi, "An Adaptive Rate Allocation System to Mitigate Fairness Issues in Wireless Mesh Networks", Master's thesis, Universiti Putra Malaysia (UPM), Selangor, Malaysia, October 2013.