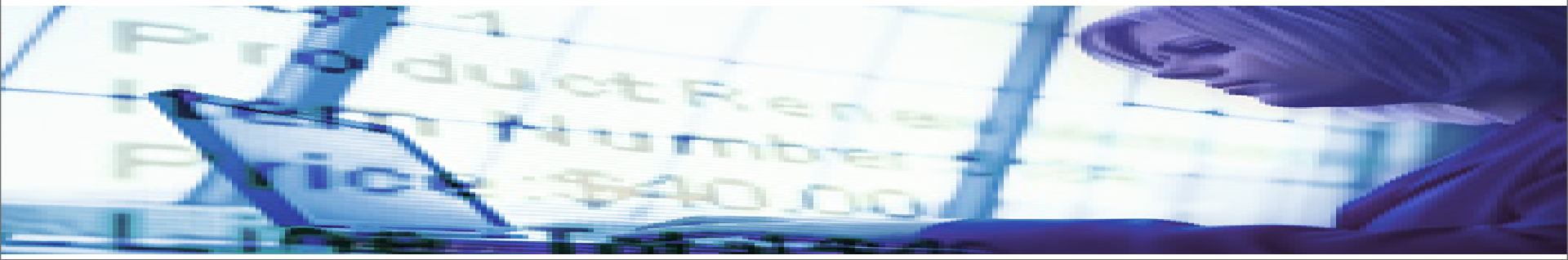
Connectivity scenarios for MANET



draft-ruffino-autoconf-conn-scenarios-00
draft-ruffino-conn-scenarios-00

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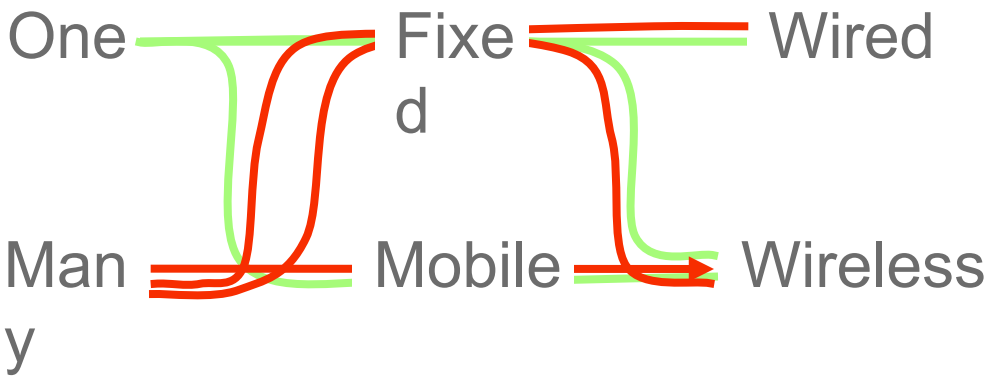
Taxonomy

Isolated

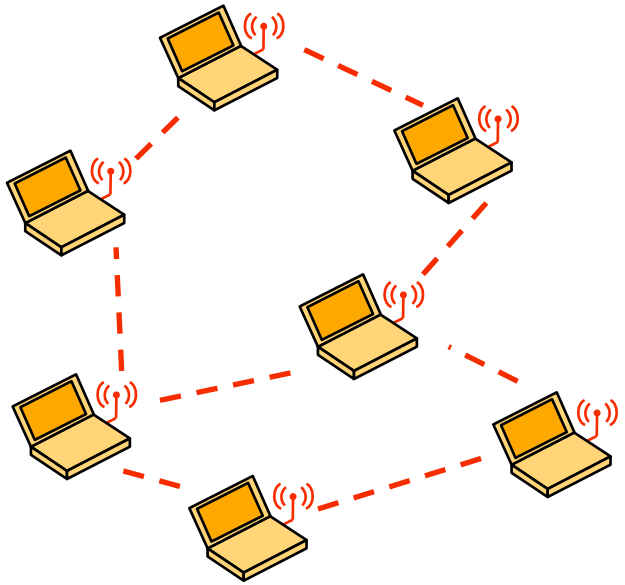
Connected

Gateways



Intermittently connected

Isolated MANET

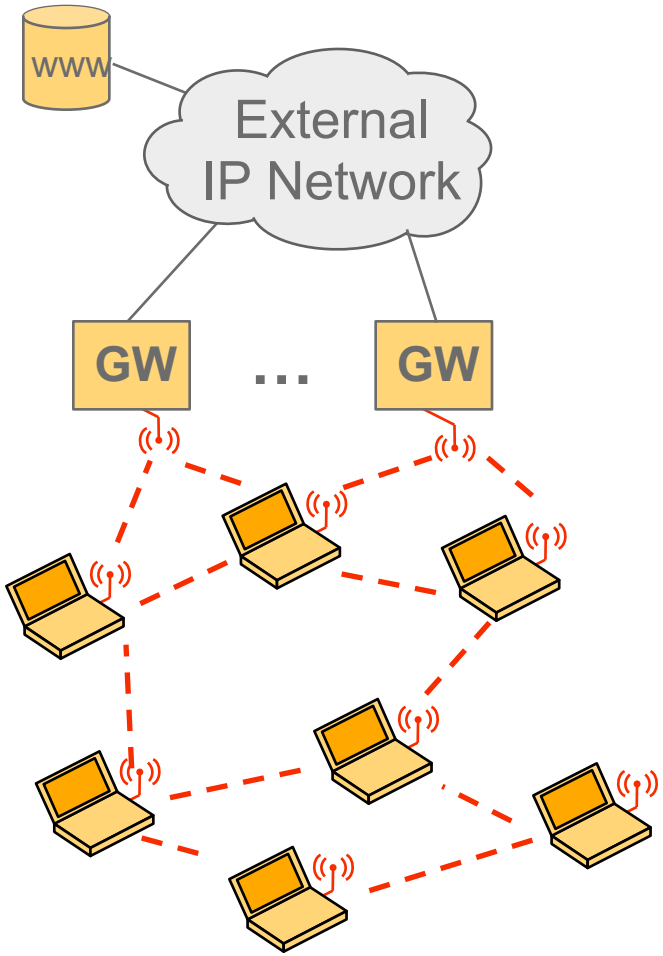


- No connection to external networks
- All traffic is generated by MANET nodes and addressed to MANET nodes
- Applications :
  - temporary networks, set-up in areas where neither wireless coverage nor infrastructure exist
  - emergency networks for disaster recovery
  - battlefield applications
  - occasional work meetings
  - file sharing among co-workers

Isolated MANET: open issues

- **Nodes must have an unique IP address**
- **Stateful autoconfiguration (e.g. DHCP)**
  - Possible, but a DHCP server should be always available
  - Service discovery problem
- **Stateless autoconfiguration**
  - Standard methods don't work on multi-hop connections
- **Merging of two or more MANETs**
  - Duplicate Address Detection needed, not only during bootstrapping

Connected MANET



- **MANET nodes**
  - exchange data traffic among themselves through multi-hop paths
  - communicate with hosts located in the external network, routing upward traffic towards a gateway
- **Gateways**
  - equipped with at least two network interfaces, one of which is connected to the MANET
  - receive return traffic from outside hosts and route it to the destination MANET node

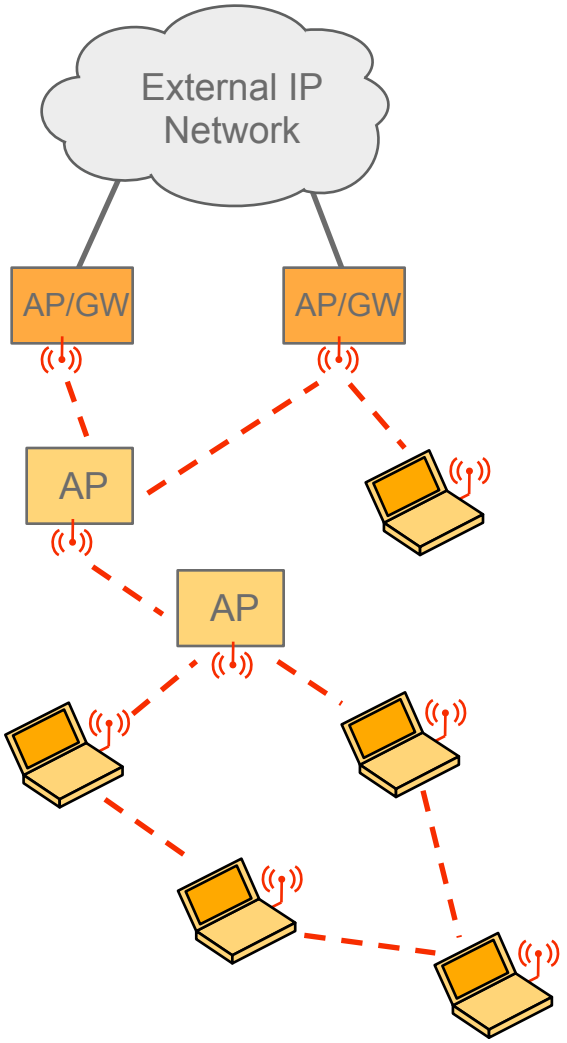
Connected MANET (cont.)

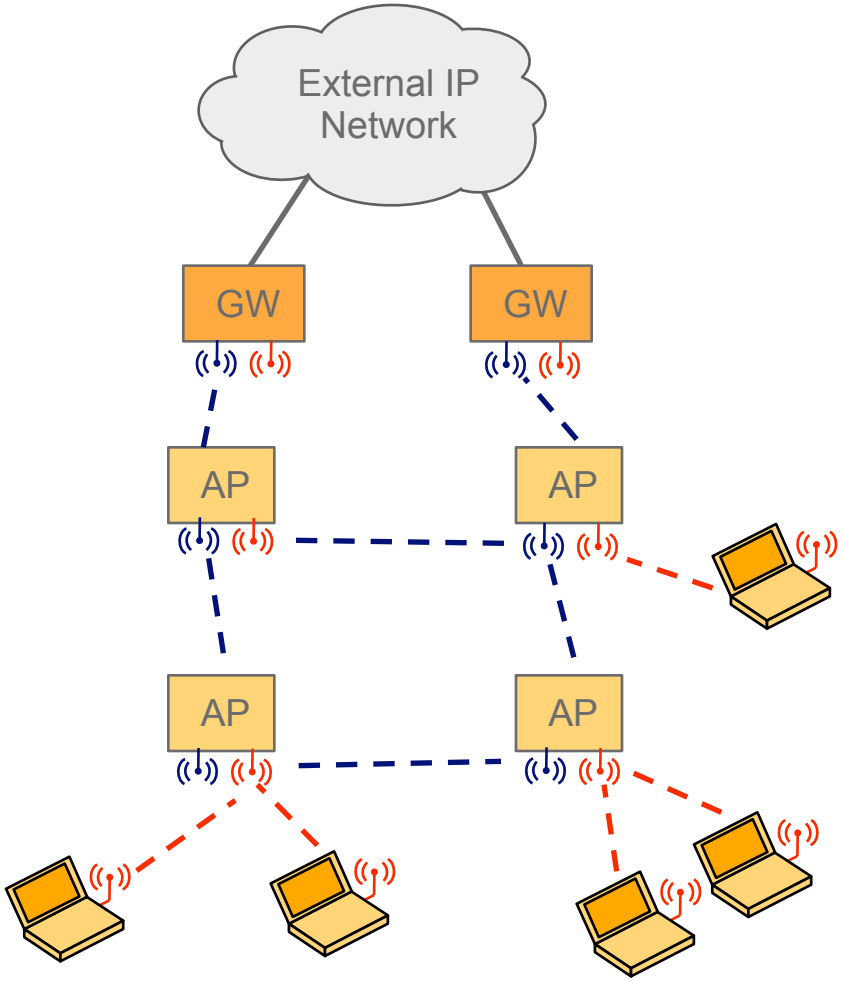
- **Gateways play a critical role**
- **Gateways can become bottlenecks**
  - if the number of nodes in the MANET increases, they route an increasing and possibly huge amount of traffic
  - this also depends on the available bandwidth on the uplink interface.
- **Depending on their characteristics, gateways:**
  - can be dedicated units, endowed with additional energy resources, more processing power, more volatile and non-volatile memory (especially if wired)
  - can be normal MANET nodes
  - can act as enforcement points for security purposes
  - provide services like DNS to MANET nodes

Connected MANET (cont.)

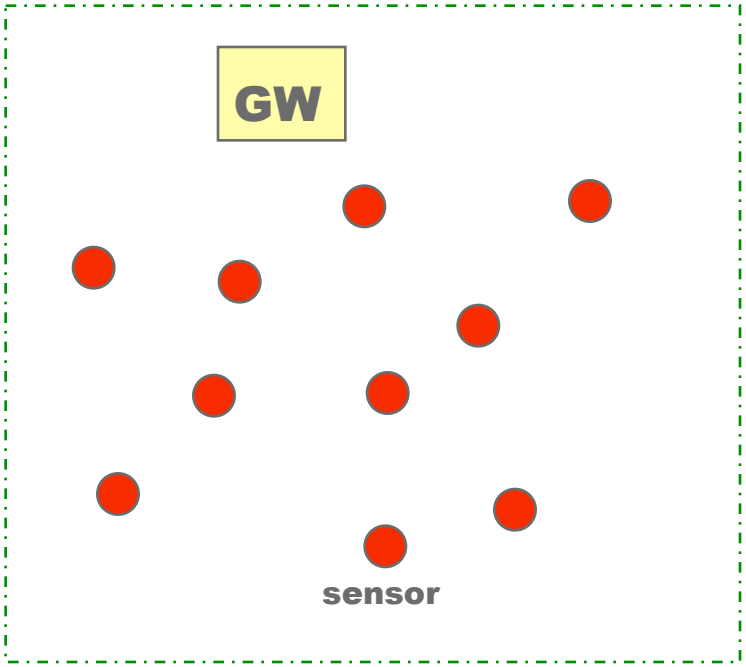
- **Gateways can**
  - participate to the external routing protocol, in order to announce internal routes to external routers and hosts, possibly performing some kind of aggregation
- **Multiple gateways can increase robustness**
  - reliability and fault tolerance
  - load balancing among gateways

Fixed gateways – Mesh networks

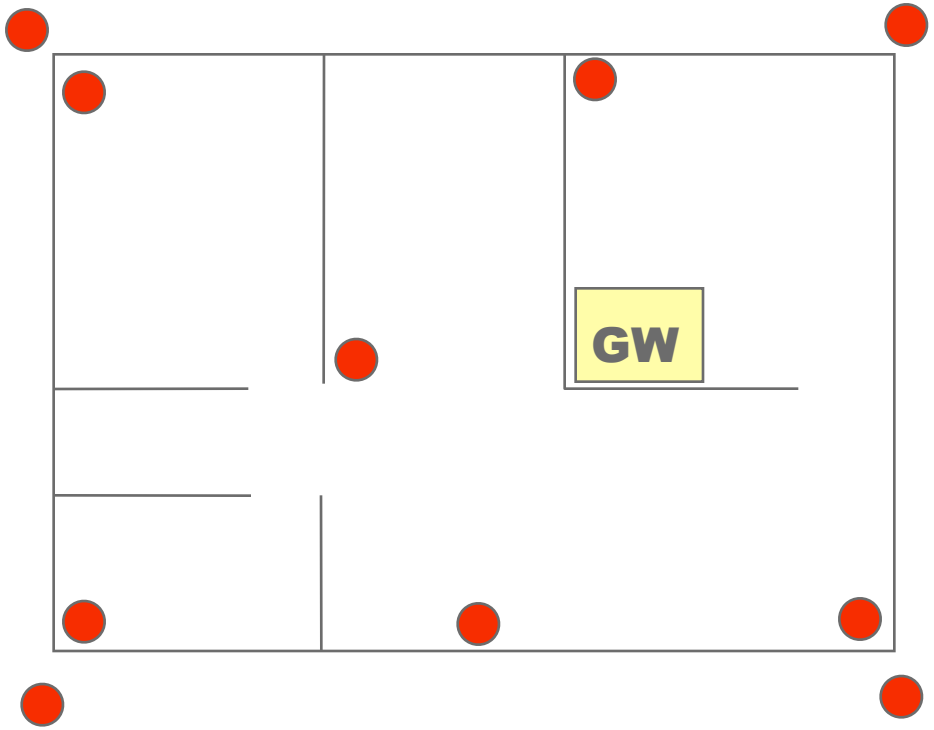




Fixed gateways – Sensor networks

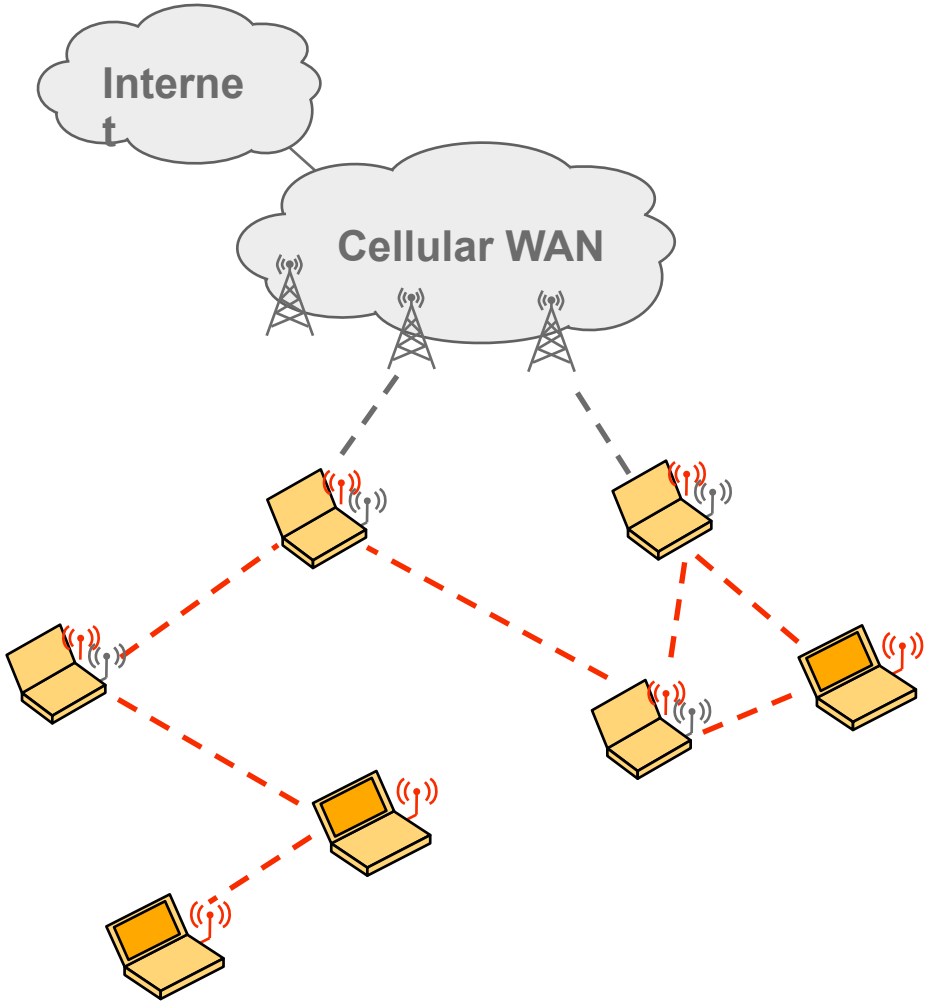


Environmental monitoring



Surveillance

Mobile Gateways - Beyond 3G system

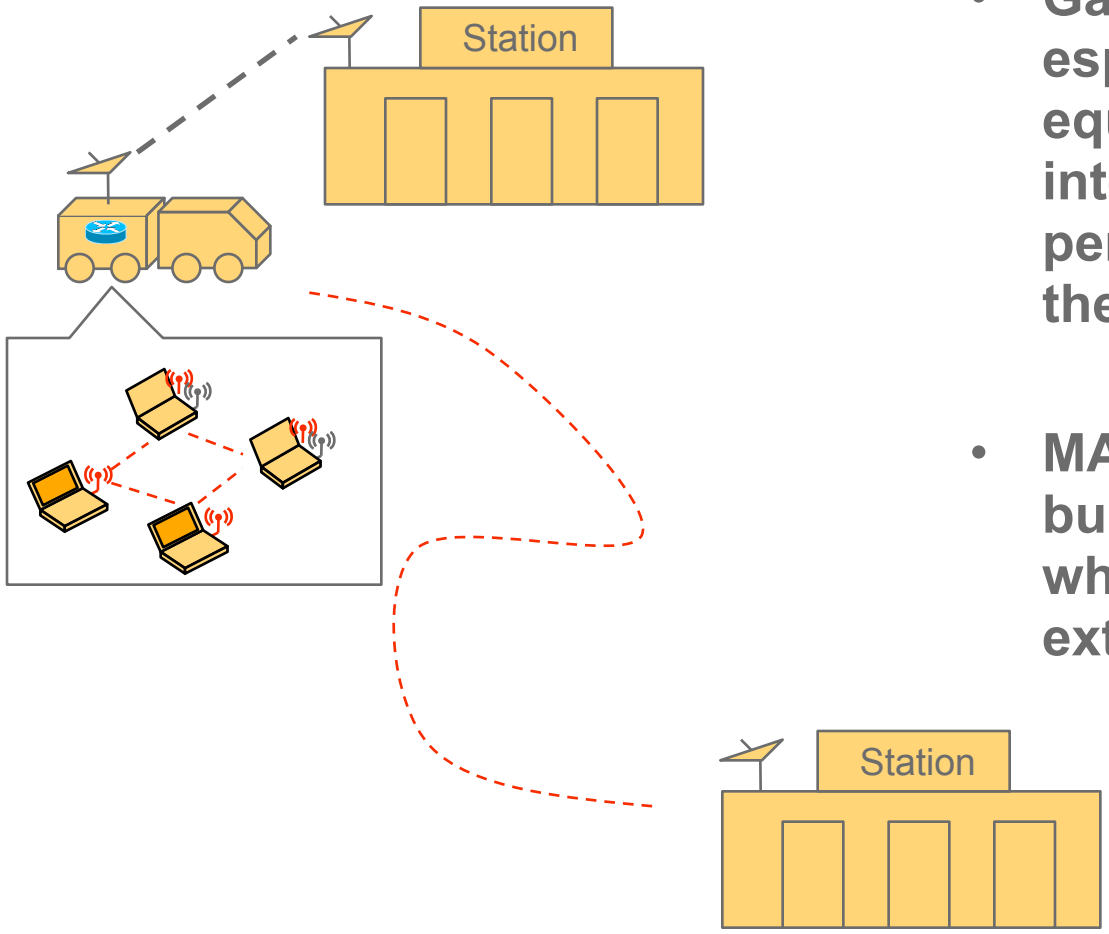


- MANET connected to a Cellular WAN
  - GSM/GPRS/UMTS, etc.
- Nodes that are within coverage area can become gateways
- Gateways are mobile
- Concurrently active multiple gateways can improve reliability

Connected MANET: open issues

- **Global IP address configuration**
  - Derived from a globally valid prefix
  - Global vs. Local scope address configuration
  - MANET Address scope (IPv4 and IPv6) is currently not defined
  - IPv6 ULA usage
- **Prefix advertisement / prefix selection**
- **DAD over multihop connection**
- **Merging and partitioning of MANETs with gateways**
- **Nodes may happen to change their global address (e.g. movement between two different MANETs)**
  - Mobile IP integration

Intermittent connection



- Gateways in a MANET, especially if mobile and equipped with a radio interface, may not be permanently connected to the external network
- MANETs may experience a burst of exchanged traffic while connected to the external network

Conclusions

- **Described scenarios are (early) real-world deployment**
- **MANET are increasingly seen as “extensions” of infrastructure networks**
- **An efficient, robust, scalable, standardized mechanism for automatic configuration of network parameters is needed**
  - To improve user experience in accessing their data and applications
  - To make deployment of MANET easier for network operators

Thanks !