

Panel:
Networking in Challenging Environments --
Hype or Reality?

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Examples of Wireless Networks for Challenging Environments

(from the panel description)

- Mobile Ad Hoc Networks
- Mesh Networks
- Sensor Networks
- Underwater Acoustic Networks
- Delay / Disruption Tolerant Networks
- Vehicular Networks -- Aerial and Ground

But ... these are very different environments

- Mobile ad hoc networks
 - Typically terrestrial, on-ground
 - Mobile nodes
 - Reasonable computation and storage resources
 - Medium-range, medium bandwidth communications
- Sensor networks
 - Multiple geography types
 - Typically fixed nodes
 - Extreme limitations in computation, storage, energy
 - Typically short-range, low bandwidth communications
- Underwater acoustic networks
 - 2D or 3D underwater
 - Fixed or mobile nodes
 - Network communication energy may not be an issue
 - Long propagation delays, low bandwidth communication
- How to avoid the litany ... security, reliability,,mobility, ...

Common themes

- Communications networks are going to pervade every part of the physical environment: from the human body to outer space
- Two broad classes of wireless networks
 - Dominant: Mass-market, broad application networks
 - Satellite, Cellular, WiFi
 - Specialized: Niche-application networks
 - Bluetooth, IR, mobile ad hoc, sensor, ...
- Hypothesis: Specialized networks risk getting swallowed up by dominant unless they
 - Have at least one compelling special application & business case
 - Perform at least 10x better in at least one key metric
 - Can develop and deploy faster than the dominant network can catch up

Answer questions with questions ...

- The Specialization Burden hypothesis: The engineering time, cost and complexity of specialized networks is too high and risks their marginalization or obsolescence
- Challenge 1: Design reuse.
 - How can the huge investment and insights in this design space be reused to reduce the burden?
- Challenge 2: Agile R&D.
 - How can the design-build-test-iterate cycle be made real and faster?
- Challenge 3: Open interfaces.
 - Can open interfaces at multiple layers for multiple key components spur distributed innovation and reduce the burden?
- Is WiFi a poster child for this approach?