LWIG document
Scope

• Try doing one single document

• Implementation guidance only
  – Not developing/changing any protocols or services
    • “The techniques shall [...] not affect conformance to the relevant specifications.”
  – Not software engineering best practices

• Guidance:
  – Focus on a limited number of protocols
  – Configuring a protocol for a constrained system
  – What can be left out — what’s the bare minimum?
“Constrained”

• Distinguish 2 rough classes of constrained nodes:
  
  • 10 kB data/100 kB code (“quite constrained”)
  • 50 kB data/250 kB code (“constrained”)

• In each case, make clear which class is being targeted
  
  • (These are a starting point for making sure we discuss from the same requirements, not exact classes.)
Implementation styles

- Single-threaded/giant mainloop
- Event-driven vs. threaded/blocking
- Single/multiple processing elements
  - E.g., separate radio/network processor

- Introduce these briefly:
  - Some techniques may be applicable only to some of these styles!
Roles of nodes

- Constrained nodes
  - Sleepy nodes
- Nodes talking to constrained nodes
  - To sleepy nodes
- Gateways/Proxies
  - To sleepy nodes
- Bandwidth/latency considerations
Planes and analysis

• Planes
  – Data plane
  – Control plane

• Security

• Analysis within a plane: Constraints may be
  – Wire-visible
  – Wire-invisible
Focus protocols

• The group shall focus only on techniques that have been used in actual implementations [...]  
• The topics for this working group will be chosen from these protocols: IPv4, IPv6, UDP, TCP, ICMPv4/v6, MLD/IGMP, ND, DNS, DHCPv4/v6, IPsec, 6LOWPAN, and RPL protocols.
Data Plane protocols

• Application Layer
  – HTTP, CoAP
  – Others? (XMPP, TFTP)

• Transport Layer
  – TCP, UDP
  – Others?

• Network Layer
  – IPv4, IPv6

• Link layer support
  – 6lowpan
Control Plane protocols

• Application Layer
  – DNS, DHCP, DHCPv6
  – Others? (SIP)
• Transport Layer
  – ?
• Network Layer
  – ICMP, ICMPv6, IGMP/MLD
  – RPL, AODV/DYMO, OLSRv2
• Link Layer support
  – ARP, ND
Security protocols

• TLS, ciphersuites, certificates
• IPsec, IKEv2, transforms, ...
• PANA, EAP, EAP methods
“Wire-visible” constraints

• Checksum
• MTU
• Fragmentation and reassembly
• Options — implications of leaving some out
• Simplified TCP optimized for LLNs
• Out-of-order packets
“Wire-invisible” constraints

- Buffering
- Memory management
- Timers
- Energy efficiency
- API
- Data structures
- Table sizes (somewhat wire-visible)
- Improved error handling due to resource overconsumption