LWIG document

Scope

- Try doing one single document
  - Document title? "Guidance for lw implementations"?
- 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