Wireless Network Support

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sam@freebsd.org

Software Architecture

- net80211 layer:
  - common infrastructure for wireless drivers
  - handles 802.11 protocol when device does not
  - common management api (ioctl's)
- drivers:
  - depend on net80211 layer
  - defer work to net80211 or override to take control
- user facilities:
  - ifconfig
  - wpa_supplicant
  - hostapd

Basics

- driver handles bit-pushing and h/w state change
- net80211 provides protocol support as needed
- data structures are an extension of driver softc (changes some with multi-bss/virtual-ap support)
- object-oriented design (driver overrides methods)
- concurrent i/o path (i.e. locking)

- performance-critical work handled in kernel
- basic 802.11 operation does NOT require user processes (different philosophy from Linux)

More Basics

- multiple control paths:
  - transmit (1 or more)
  - receive (only one)
  - control (ioctl, 1 or more)
  - beacon preparation (ap mode)
- data structures managed for full concurrency
- synchronization between driver and net80211 managed with state machine (ic_newstate)

Design Issues

- locking confusion due to layering
- drivers use single softc lock and have no concurrent tx/rx path
- multiple transmit queues not handled by current ifnet architecture
- modularity not well supported (e.g. loading crypto modules on demand