



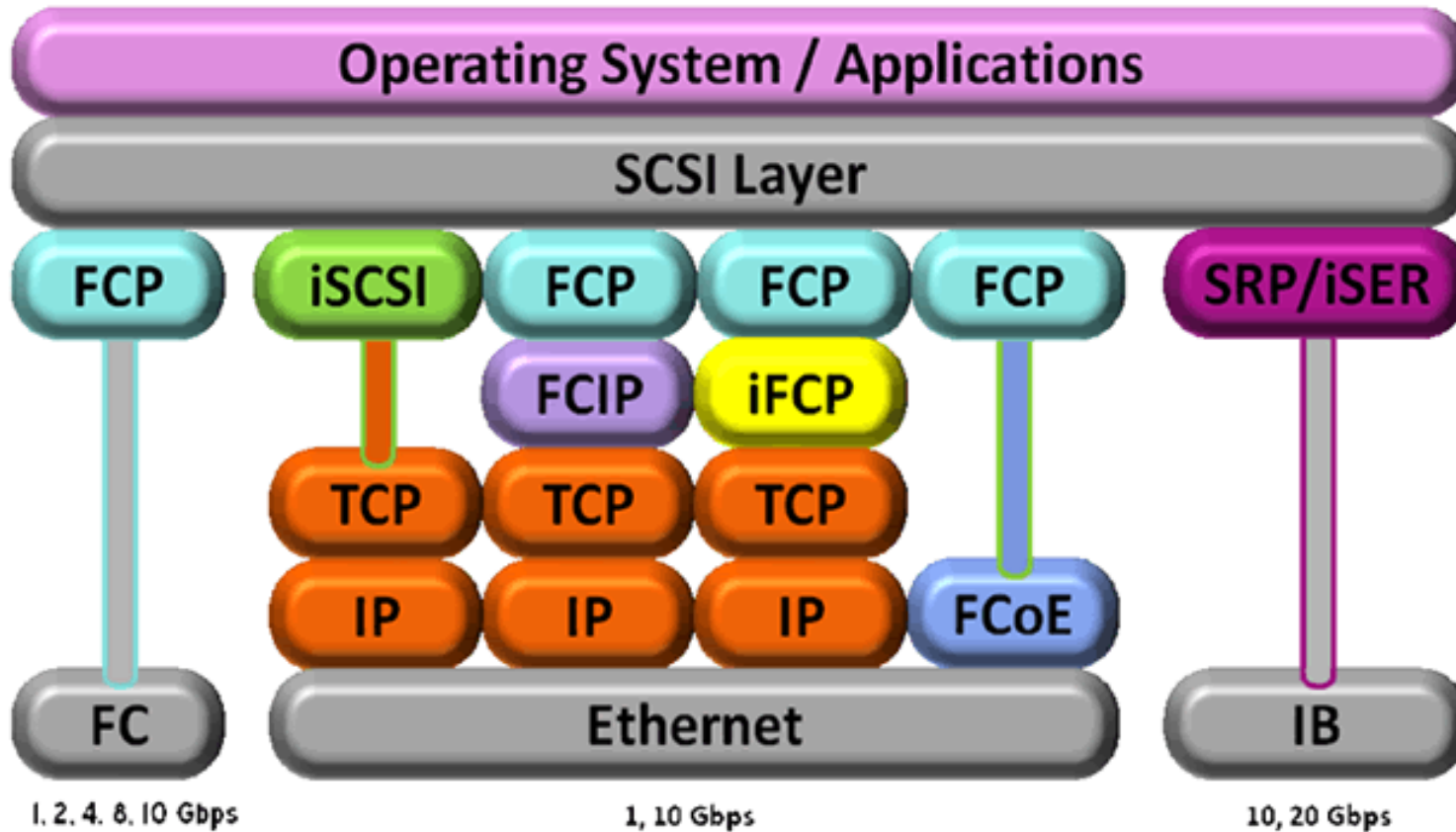
Fibre Channel over Ethernet

Robert Love
Chris Leech

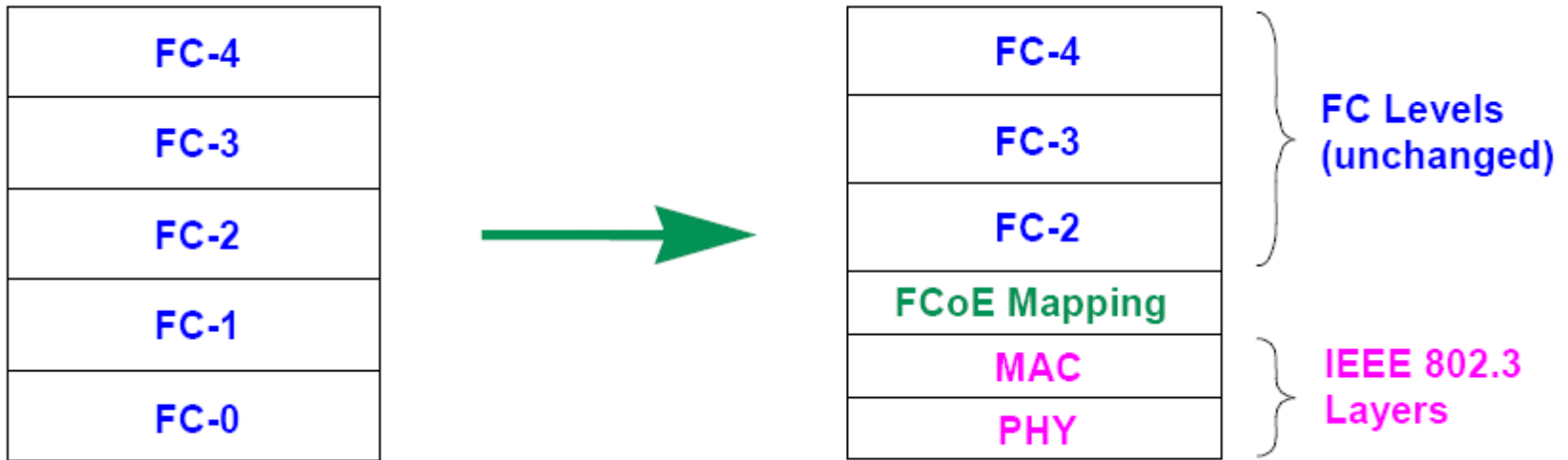
What is Fibre Channel over Ethernet?

- An encapsulation protocol to carry Fibre Channel frames over Ethernet
- Standardized in T11
- Focused on SCSI FCP
 - Not interested in IP over Fibre Channel over Ethernet 😊
- A discovery protocol is being worked on
- Not an Intel invention
 - We're interested because we sell lots of Ethernet
 - Just one of many companies active in T11

SCSI transports from FCIA



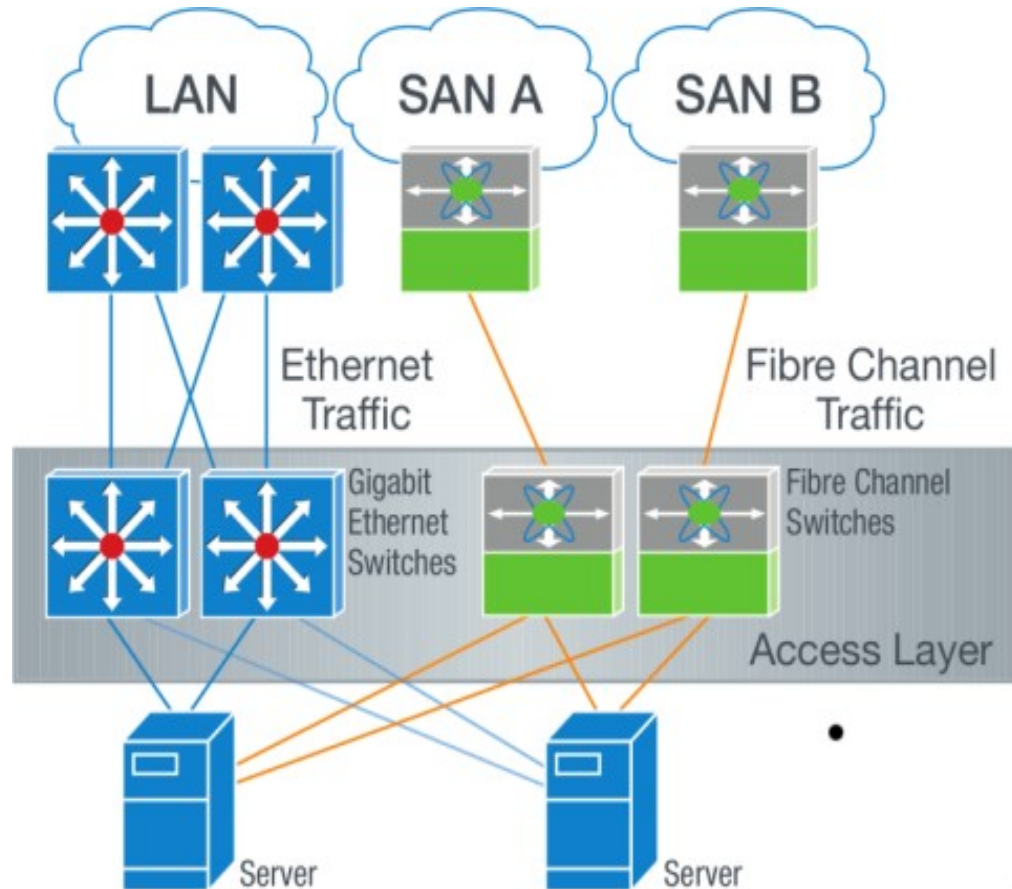
From FC to FCoE



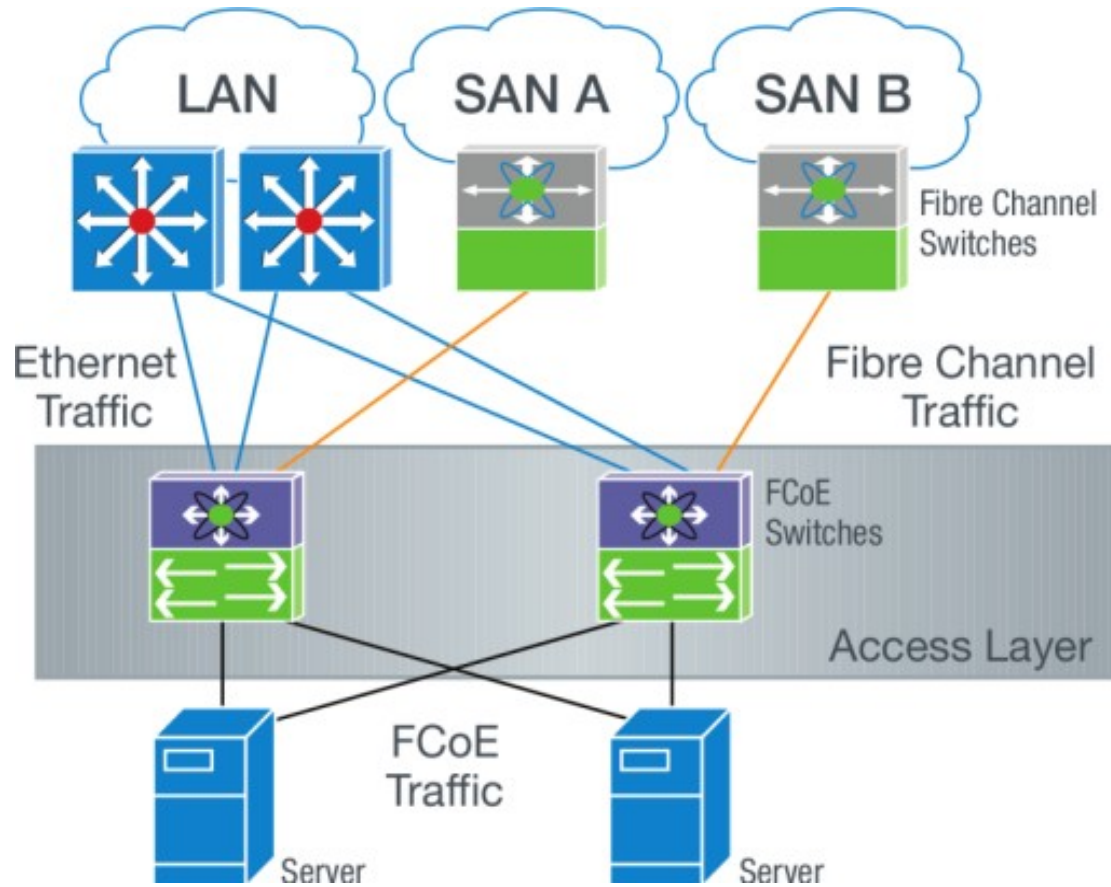
Comparison with iSCSI/AoE/etc.

- Bridgeable to existing FC storage infrastructure through high performance switches
 - Maintain use of current FC investments
 - Gateway device keeps little or no extra state over a standard FC switch
- Designed to be one part of an FCP based SAN
 - FC attached initiators and targets
 - Ethernet attached initiators and targets
 - FCIP inter-switch links

Separate LAN SAN topology



Consolidated LAN SAN



State of Open-FCoE.org

- Now

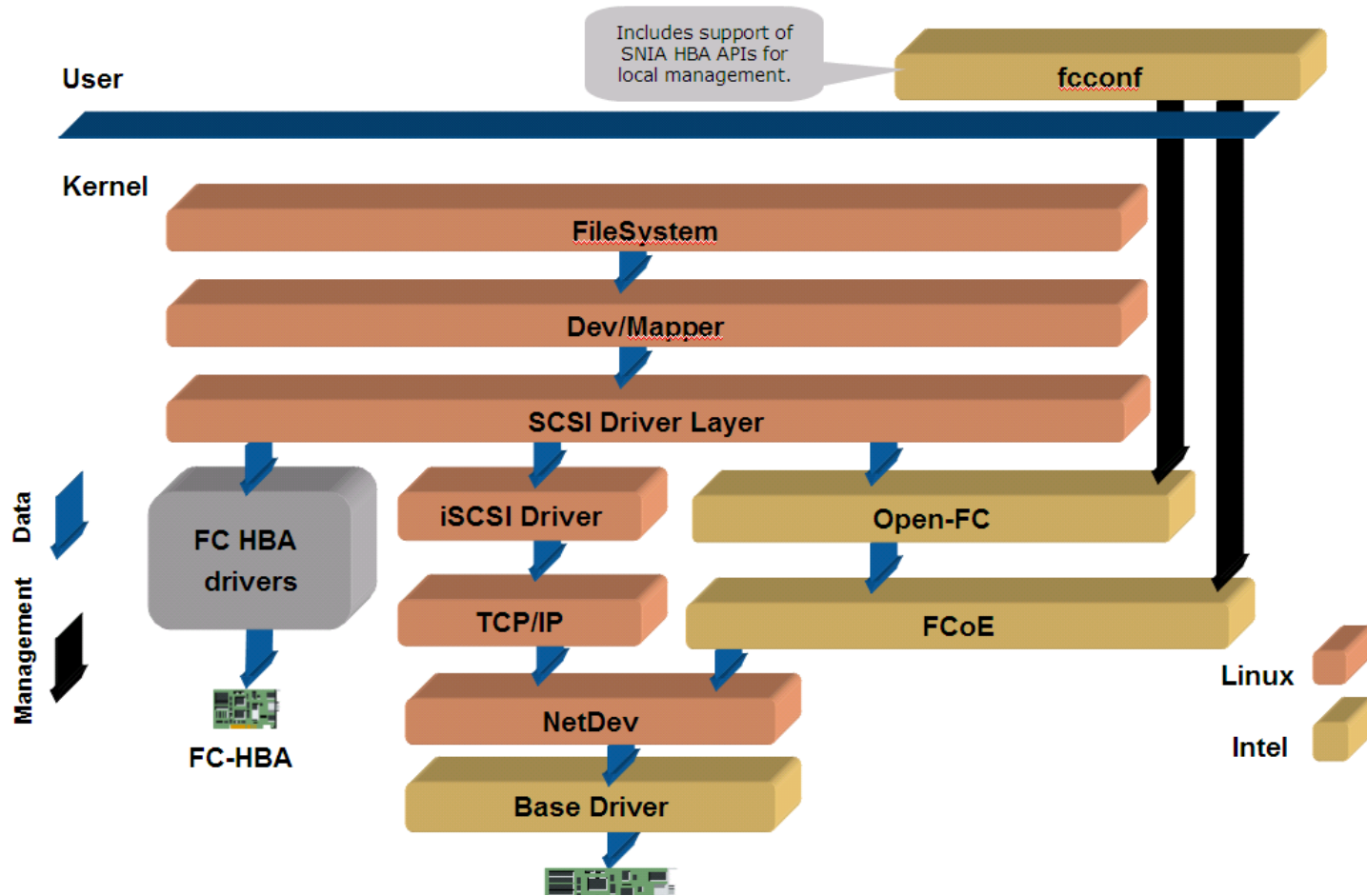
- Functional initiator stack
 - Fibre Channel in software
 - FCoE encapsulation
 - Works over any Ethernet interface with pause support
 - Makes use of multi-MAC address support in kernel, or promiscuous mode if not available
- FCoE development tools
 - Software target that works in p2p topologies (SCST based)
 - Software gateway that works with special FC adapter driver
 - Wireshark has an FCoE decoder already

- Next

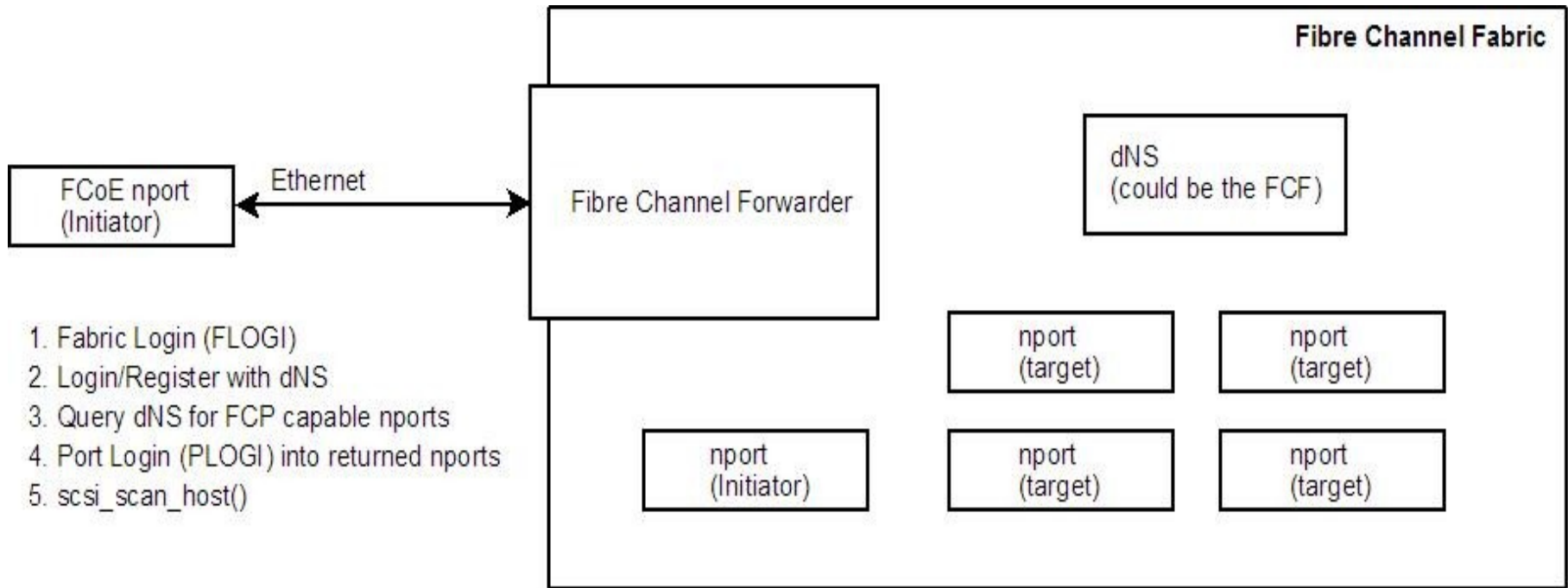
- Branch to focus on re-architecture
- “library-ize”



Open-FCoE Current Architecture



Fabric/Port login overview



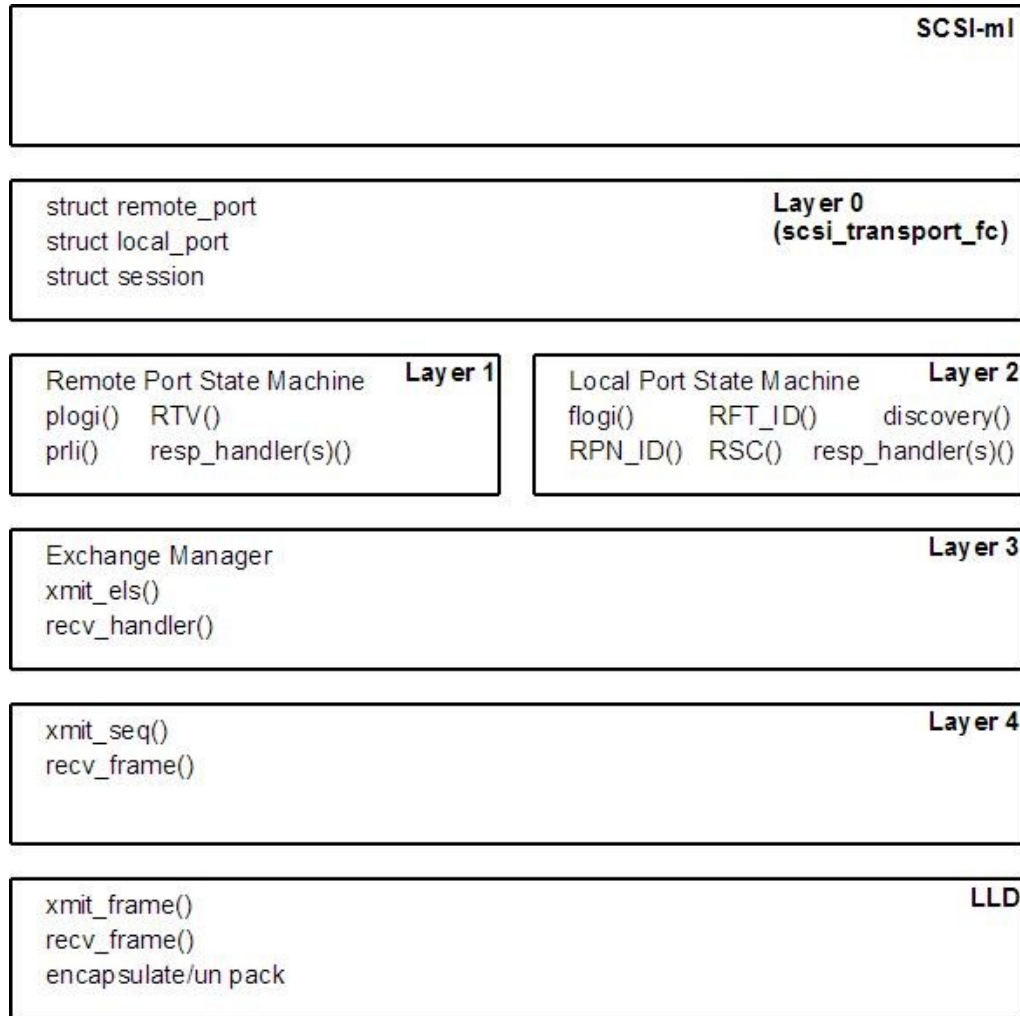
Problems with Open-FCoE architecture

- Too many abstractions
- Too complicated
- Doesn't benefit existing FC infrastructure/HBAs

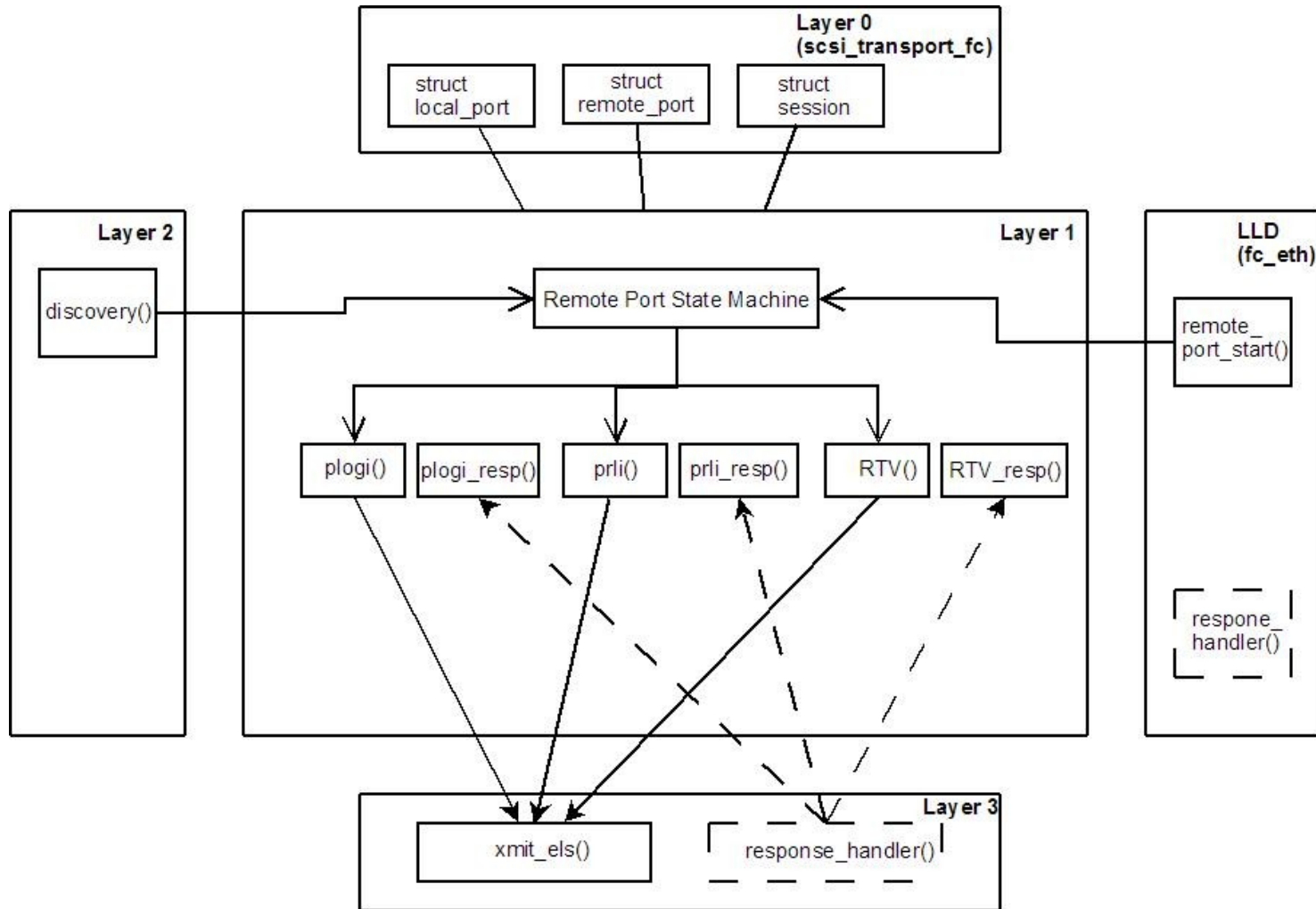
Future Direction of Open-FCoE stack

- Reworking code to be more integrated with existing Linux SCSI/FC code
 - Agree with James Smart's suggestions
- `scsi_transport_fc` provides basic objects and management interfaces
- `libfc` for building FC drivers with various combinations of hardware and software support
 - 3 supported SCSI data path options:
 - Full hardware/firmware FCP management
 - FCP and framing fully in software, frame level driver interface
 - FC sequence send/receive offload, FCP managed in software
 - Local and remote port state machines
 - Managed in either software, hardware/firmware, or some combination defined by the driver and support by `libfc`

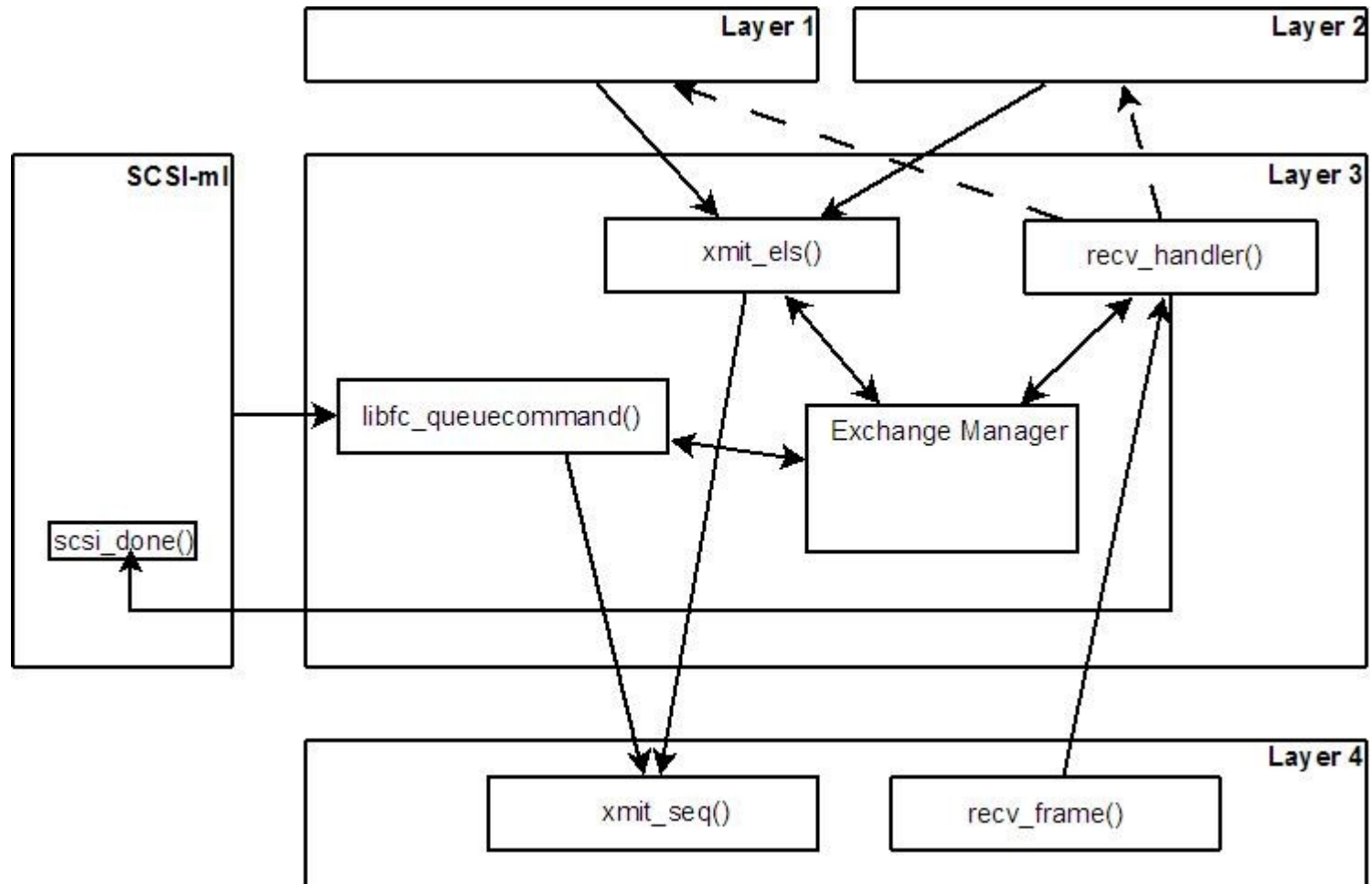
libfc layering overview



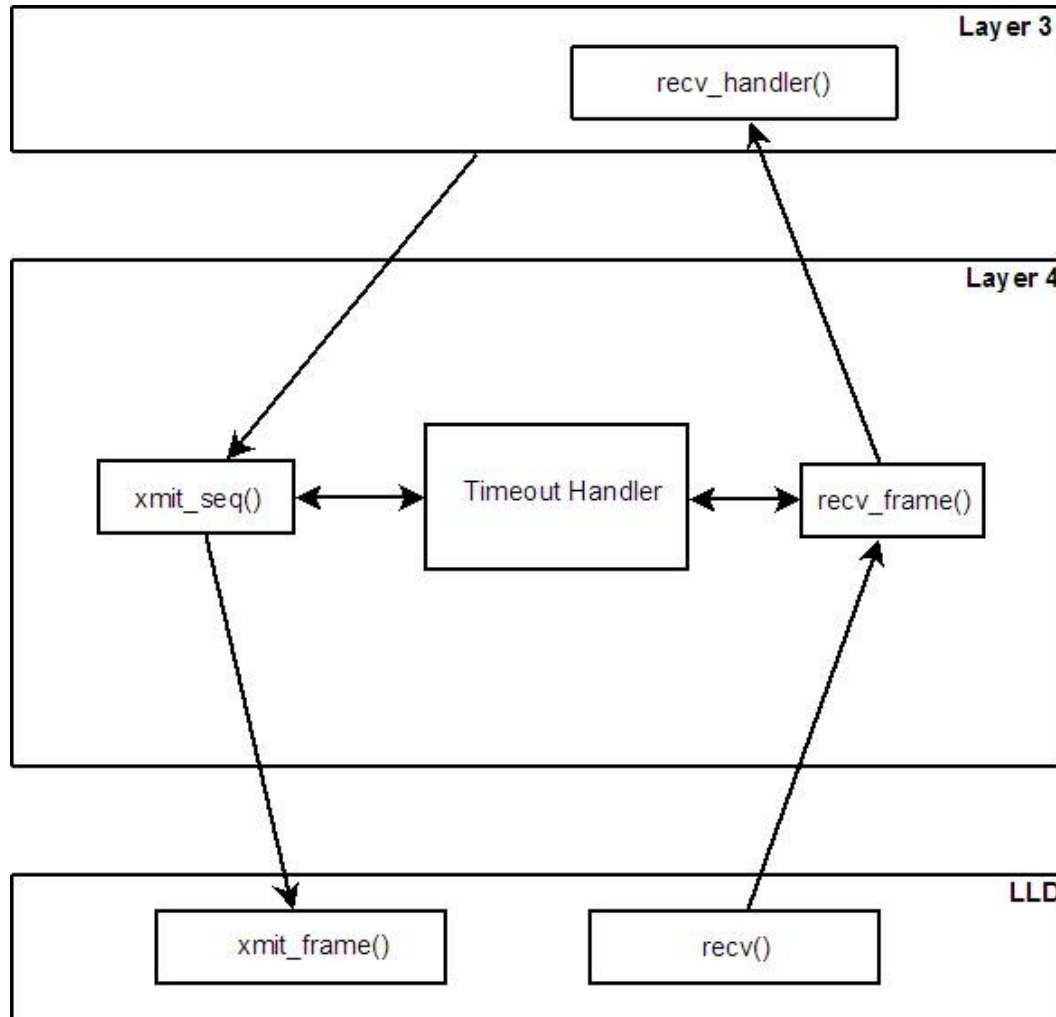
libfc remote port state machine



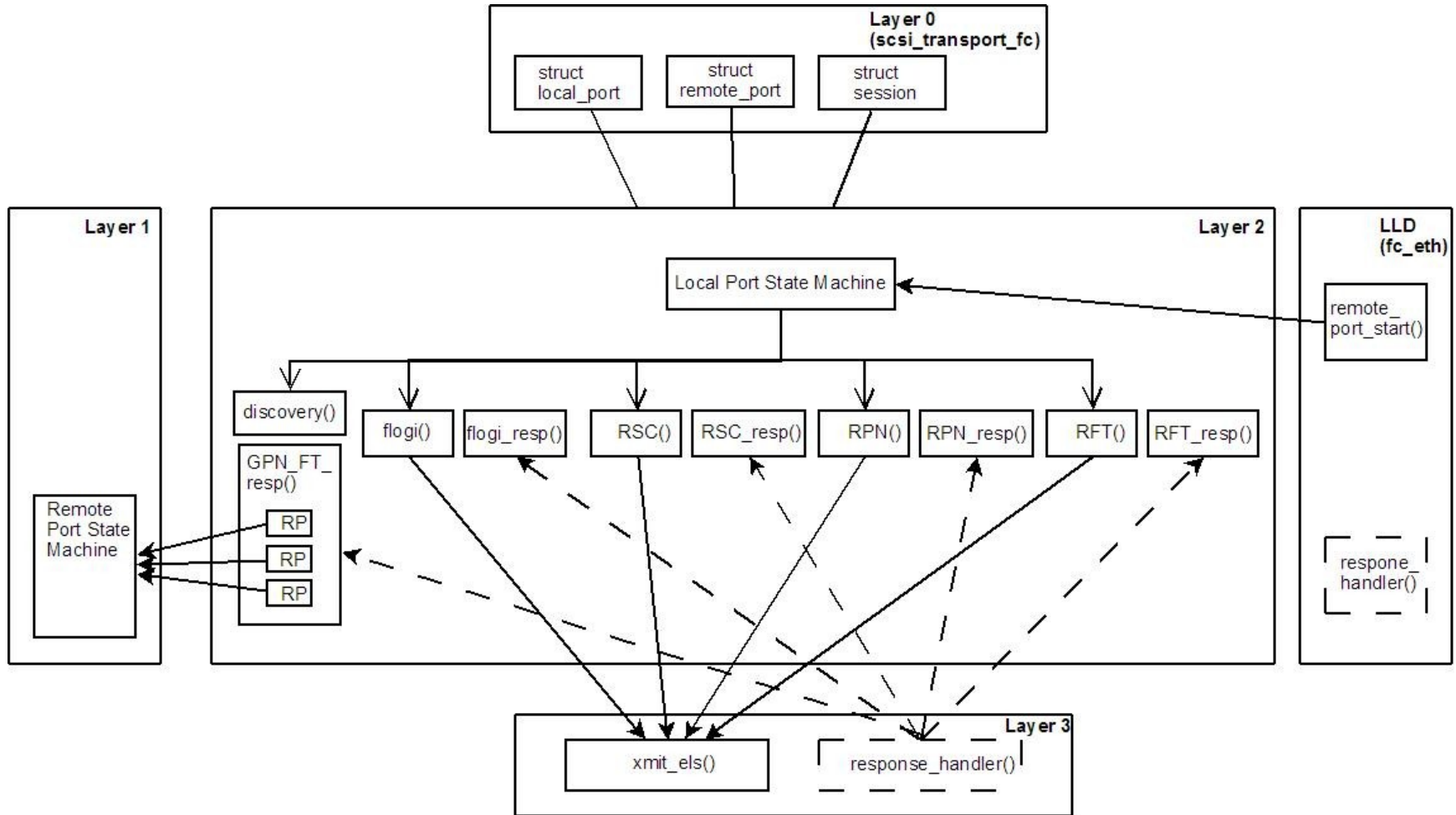
libfc ELS handling and exchange manager



Libfc sequence management / framing



libfc local port state machine



Talking Points

- Scsi_transport_fc
 - Session, local_port, remote_port
 - Sysfs/ioctl()
- Libfc usage
 - Fc_host
 - Fc_transport_template
- “library”
 - Libfc as a module not all in scsi_transport_fc
- Target
- state_change_handler()
 - reduces number of function pointers in fc_transport_template
 - Allows LLDs to define their own state machine flows

