

SDN/OpenFlow Analysis

SharkFest '16

SDN/OpenFlow Analysis

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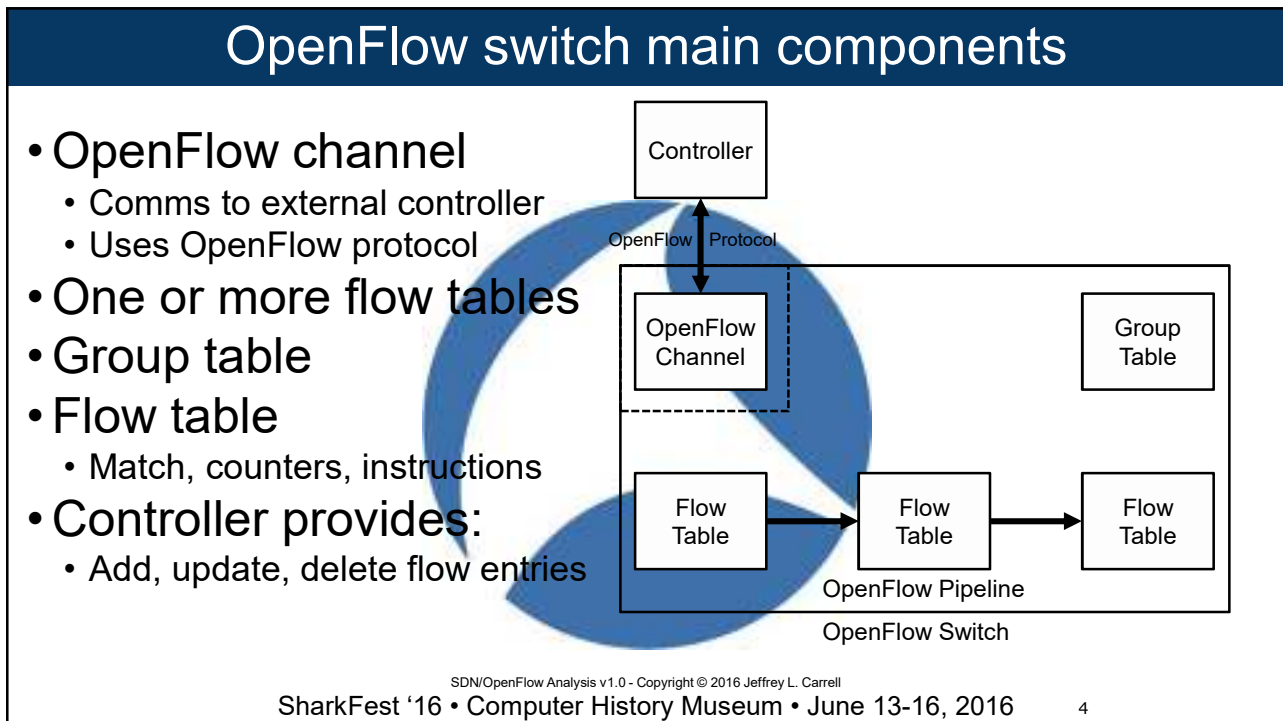
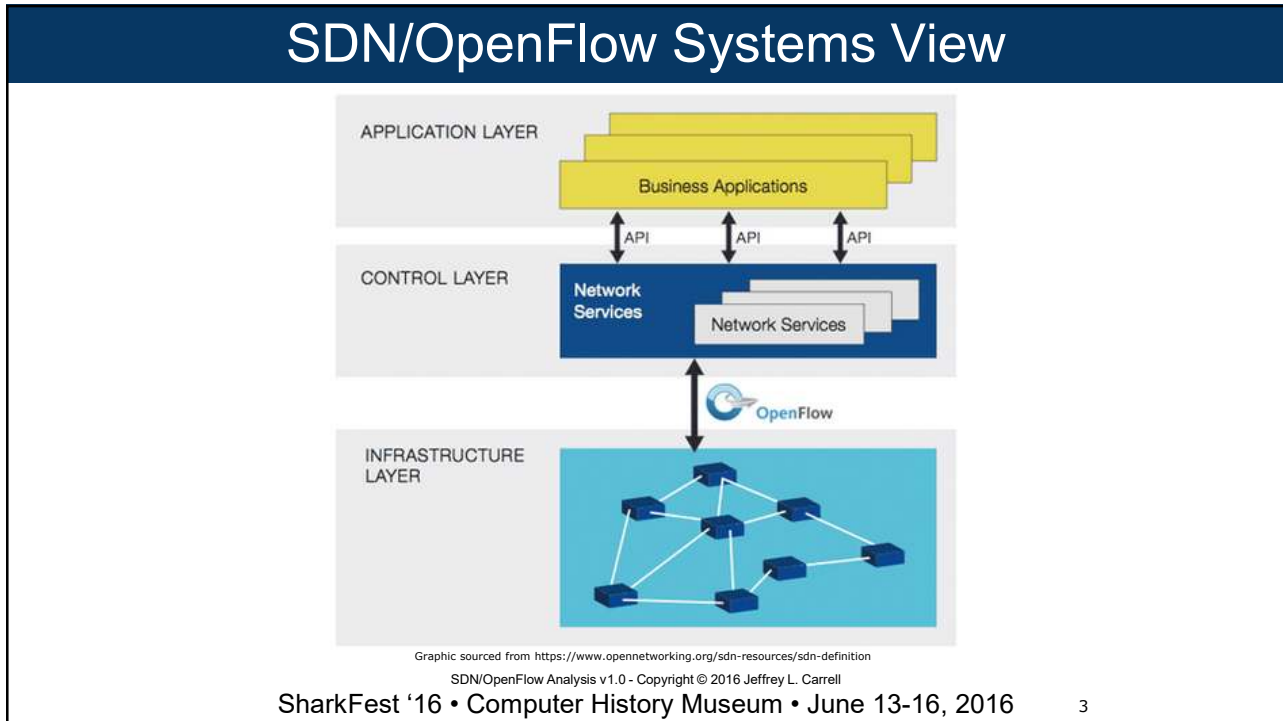
- SDN basics
- OpenFlow basics
- OpenFlow comms
- Demonstration and examining OpenFlow trace

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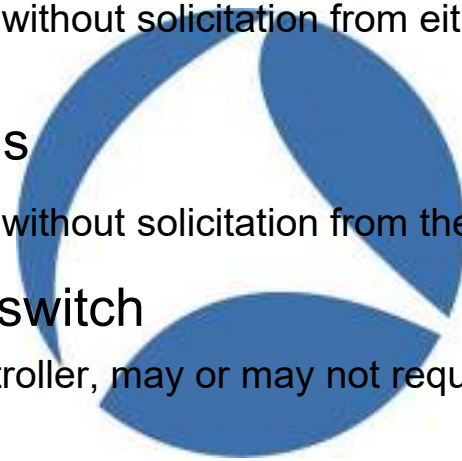
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OpenFlow Messages

- **Symmetric**
 - Messages sent without solicitation from either the controller or the switch
- **Asynchronous**
 - Messages sent without solicitation from the controller
- **Controller to switch**
 - Initiated by controller, may or may not require a response from the switch



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Symmetric OpenFlow messages

Message	Description
Hello	Hello messages are exchanged between the switch and controller upon connection startup, an important element is OpenFlow version negotiation.
Echo	Echo request/reply messages can be sent from either the switch or the controller, and they must return an echo reply. They are mainly used to verify the liveness of a controller-switch connection (a timeout indicates disconnect), and may also be used to measure latency or bandwidth.
Experimenter	For additional functionality, generally proprietary per vendor.

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Asynchronous OpenFlow messages

Message	Description
Packet-In	Switch sends a packet to the controller.
Flow Removed	When switch removes a flow entry (due to hard or idle timeout or in-activity) informs controller.
Port Status	Switch informs controller when a port changes state (ie., interface up/down).
Error	Sent by switch or controller to inform of failure of an operation.

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Controller to Switch OpenFlow messages

Message	Description
Features	Controller requests features/capabilities of switch. Switch replies with its capabilities.
Configuration	Controller can query and set configuration parameters in a switch. A switch will reply with parameter stings, but not a to a configuration set by the controller.
Modify-State	The controller can send message to switch to add, delete, modify flow or group entries, and also set port properties on a switch.
Read-State	Collect information from switch, such as statistics, capabilities, and current configuration.

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Controller to Switch OpenFlow messages

Message	Description
Packet-out	Direct packet to a specified port or ports on the switch.
Barrier	Barrier request/reply messages are used by the controller to ensure message dependencies have been met or to receive notifications for completed operations.
Role-request	Set or query role of the OpenFlow channel. Useful when switch connects to multiple controllers.
Asynchronous-Configuration	Set filter on asynchronous messages or query that filter. Useful when switch connects to multiple controllers.

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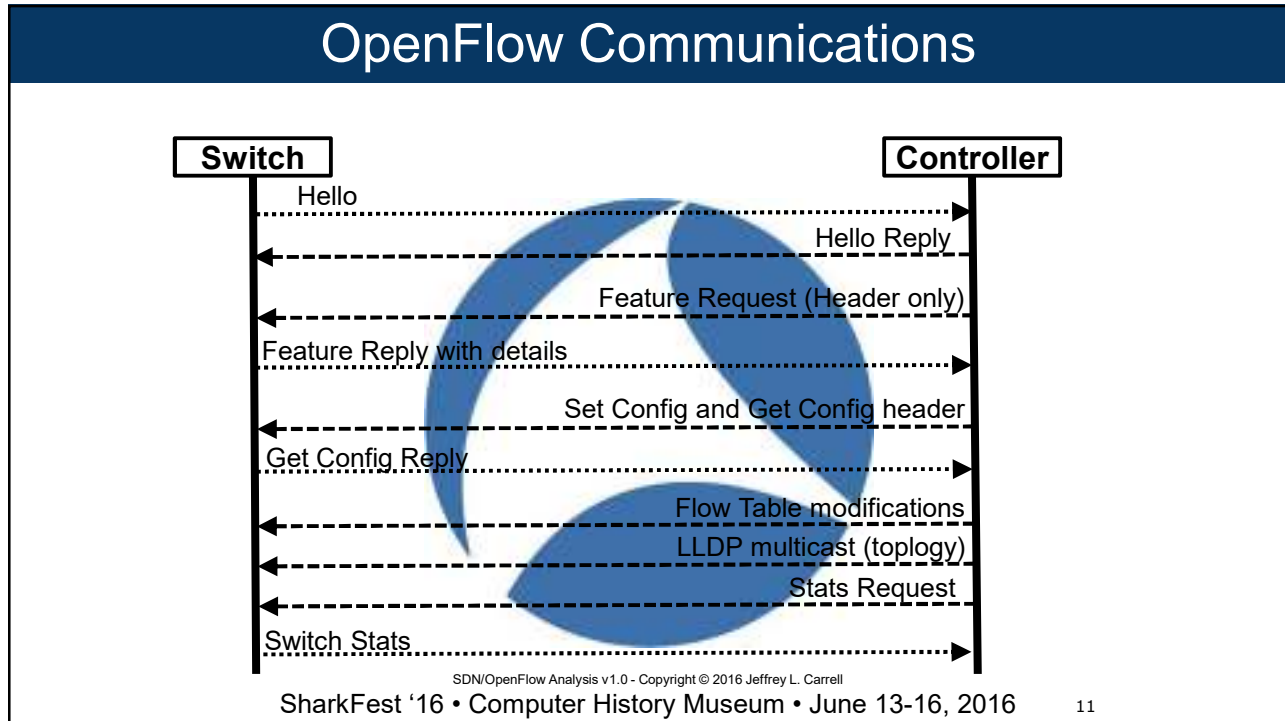
OpenFlow Ports

OpenFlow capable switches must support three types of OpenFlow ports:

- Physical ports
 - Hardware interface
 - Virtual hardware interface (virtual switch)
- Logical ports
 - No hardware interface
 - Link-aggregation groups, tunnels, loopback interfaces
- Reserved ports
 - CONTROLLER, TABLE, IN_PORT, LOCAL, NORMAL and others

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Thank You for Attending!



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