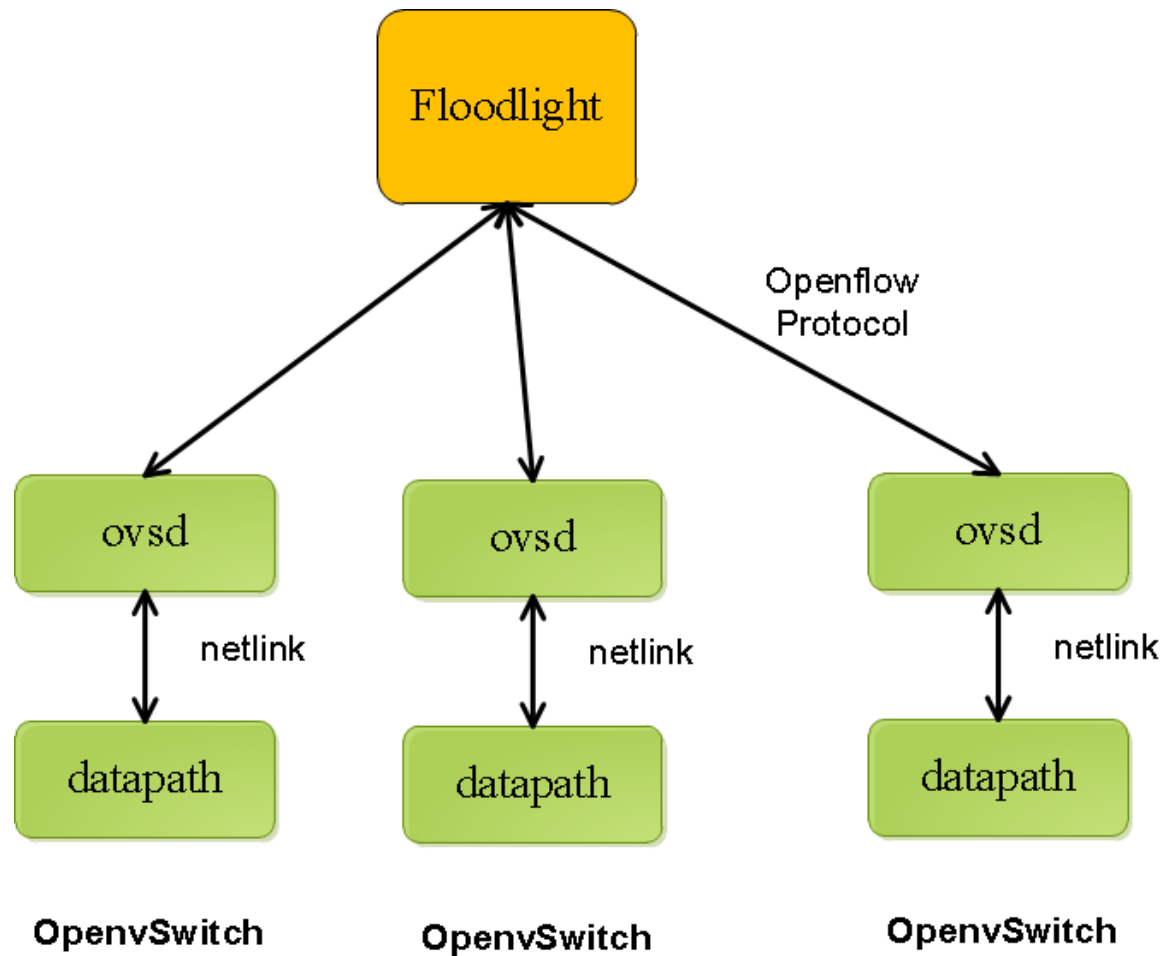


Extend the OF protocol with Floodlight + OVS

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2012-12-19

Model Overview



Problem Statement

- Extend existing Openflow (1.0) protocol
 - Add a new OF msg: **PacketRemote**
 - Add a new OF action: **ActionRemote**
- Implement it within the Floodlight-OVS model
 - Controller
 - OpenvSwitch user space (ovsd)
 - OpenvSwitch kernel space (datapath)

Controller

- new OF msg: **PacketRemote**
 - New msg class:
src/main/java/org/openflow/protocol/OFPacketRemote.java
 - Add new msg into public enum OFType {}:
src/main/java/org/openflow/protocol/OFType.java

Controller

- new OF action: **ActionRemote**
 - New action class:
src/main/java/org/openflow/protocol/action/OFActionRemote.java
 - Add new action into public enum OFActionType {}:
src/main/java/org/openflow/protocol/action/OFActionType.java

Controller

- Use the new msg/action in the app!
 - private Command
processPacketInMessage(IOFSwitch sw,
OFPacketIn pi, FloodlightContext cntx) {...}

OpenvSwitch (user space)

- OpenFlow Layer
 - New msg
 - New action
- OVS Abstraction Layer
 - New msg
 - New action
- OF Related functions
- *handle_packet_remote()*

OpenvSwitch (user space)

- OpenFlow Layer
 - New msg

```
struct ofp_packet_remote {
    ovs_be32 buffer_id;      /* ID assigned by datapath or UINT32_MAX. */
    ovs_be16 in_port;        /* Packet's input port (OFPP_NONE if none). */
    ovs_be16 actions_len;    /* Size of action array in bytes. */
    /* Followed by:
     * - Exactly 'actions_len' bytes (possibly 0 bytes, and always a multiple
     *   of 8) containing actions.
     * - If 'buffer_id' == UINT32_MAX, packet data to fill out the remainder
     *   of the message length.
     */
};
OFP_ASSERT(sizeof(struct ofp_packet_remote) == 8);
```


OpenvSwitch (user space)

- OpenFlow Layer
 - New action

```
struct ofp_action_remote {  
    ovs_be16 type;          /* OFPAT10_REMOTE. */  
    ovs_be16 len;           /* Length is 8. */  
    ovs_be16 port;          /* Output port. */  
  
    uint8_t pad[6];         /* pad. */  
    ovs_be32 ip;            /* Remote ip. */  
};  
OFP_ASSERT(sizeof(struct ofp_action_remote) == 16);
```

OpenvSwitch (user space)

- OVS Abstraction Layer
 - New msg

```
struct ofputil_packet_remote {  
    const void *packet;    /* Packet data, if buffer_id == UINT32_MAX. */  
    size_t packet_len;    /* Length of packet data in bytes. */  
    uint32_t buffer_id;    /* Buffer id or UINT32_MAX if no buffer. */  
    uint16_t in_port;    /* Packet's input port. */  
    struct ofpact *ofpacts; /* Actions. */  
    size_t ofpacts_len;    /* Size of ofpacts in bytes. */  
};
```

OpenvSwitch (user space)

- OVS Abstraction Layer
 - New action

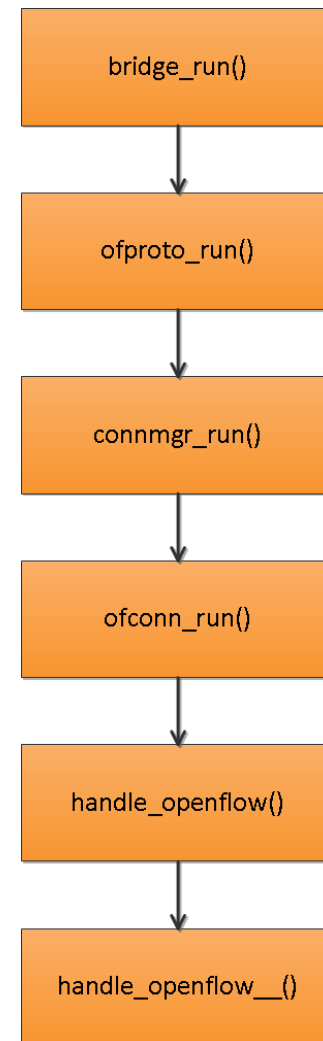
```
/* OFPACT_REMOTE.  
 *  
 * Used for OFPAT10_REMOTE. */  
struct ofpact_remote {  
    struct ofpact ofpact;  
    uint16_t port;      /* Output port. */  
    uint32_t ip;        /* Remote ip. */  
};
```

OpenvSwitch (user space)

- OF Related functions
 - static enum ofperr *remote_from_openflow10*(const struct ofp_action_remote *oar, struct ofpbuf *out)
 - static enum ofperr *ofpact_from_openflow10_remote*(const struct ofp_action_remote *a, struct ofpbuf *out)
 - static enum ofperr *ofpacts_from_openflow_remote*(const struct ofp_action_remote *in, size_t n_in, struct ofpbuf *out, enum ofperr (*ofpact_from_openflow)(const struct ofp_action_remote *a, struct ofpbuf *out))
 - static void *ofpact_remote_to_openflow10*(const struct ofpact_remote *remote, struct ofpbuf *out)
 - ...

OpenvSwitch (user space)

- Entire processing
 - *bridge_run()* → ... → *handle_openflow__()*
 - Add *handle_packet_remote()* in *handle_openflow__()*



OpenvSwitch (user space)

- *handle_packet_remote()*
 - *ofputil_decode_packet_remote()*: processing received of msg.
 - *packet_remote()*: execute action.

OpenvSwitch (kernel space)

- *ovs_packet_cmd_execute()*
 - *validate_actions()*: validate the length of action.
 - *ovs_execute_actions()*: execute action.

Are we done now?

Not yet, actually.

That's only the over-simplified framework.

Suggest read the attached doc and the codes, for details on msg processing, formatting, protocol/action handling, etc.

Thanks for any question!

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