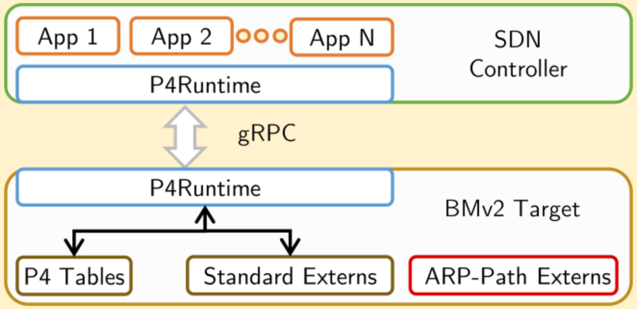
ARP-P4: A hybrid ARP-Path/P4Runtime switch

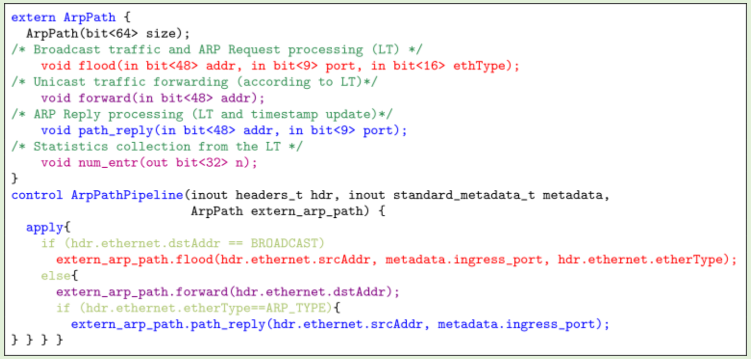
Motivations

- To explore the current capabilities of the P4 specifications to establish autonomous paths.
- To study the feasibility of hybrid SDN approaches such as ARP-Path/P4Runtime

Limitations



ARP-Path P4 Implementation



```
extern ArpPath {
  ArpPath(bit<64> size);
/* Broadcast traffic and ARP Request processing (LT) */
    void flood(in bit<48> addr, in bit<9> port, in bit<16> ethType);
/* Unicast traffic forwarding (according to LT)*/
    void forward(in bit<48> addr);
/* ARP Reply processing (LT and timestamp update)*/
    void path_reply(in bit<48> addr, in bit<9> port);
/* Statistics collection from the LT */
    void num_entr(out bit<32> n);
}
control ArpPathPipeline(inout headers_t hdr, inout standard_metadata_t metadata,
                        ArpPath extern_arp_path) {
  apply{
    if (hdr.ethernet.dstAddr == BROADCAST)
      extern_arp_path.flood(hdr.ethernet.srcAddr, metadata.ingress_port, hdr.ethernet.etherType);
    else{
      extern_arp_path.forward(hdr.ethernet.dstAddr);
      if (hdr.ethernet.etherType==ARP_TYPE){
        extern_arp_path.path_reply(hdr.ethernet.srcAddr, metadata.ingress_port);
} } } }
```

Conclusions

- ARP-P4 does not need to use any local controller.
- The ARP-P4 switch can interact with P4 Runtime and ARP-Path so ARP-P4 is a hybrid switch.
- The ARP-P4 performance is very similar than ECMP when the load has low load, while the performance on high load decreases due to BMv2 Target implementation.

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