XIA + SCION Integration

- Inter-domain routing can use either XBGP or SCION
- Intra-domain routing always uses centralized SDN protocol (unnamed)
  - Controller sets up intra-domain routes to SCION Certificate, Beacon, and Path Server SIDs

- Possibilities for who chooses the inter-domain routing protocol:
  - End-host can choose SCION on a per-packet basis
  - Domain controller can choose SCION on a per-packet basis
  - Domain controller can choose SCION for the whole domain

- Either way, the decision to use SCION must be made before or upon an end-host's packet reaching its gateway router, so that it can be forwarded to the proper domain egress if SCION is chosen

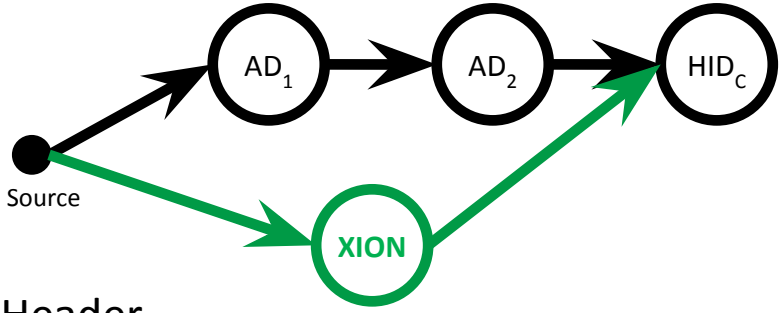
Bootstrapping SCION

1. Each domain's controller populates intra-domain forwarding entries
   a. This includes entries for SCION Certificate, Beacon, and Path Server SIDs
2. Each domain's controller uses XBGP to setup forwarding entries for reaching other ADs
3. As defined by SCION, Beacon Servers propagate PCBs to other ADs
   a. Other ADs are reached using routes setup by XBGP
4. As defined by SCION, ADs use PCBs to construct and register paths with Path Servers

Using SCION

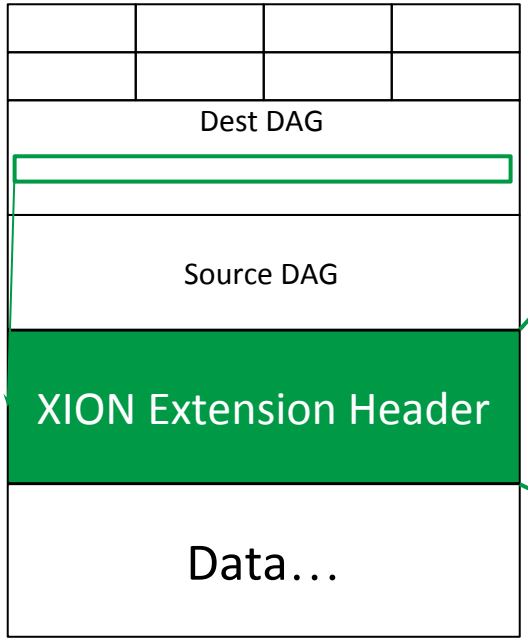
1. We introduce a new principle type called XION for packets that should use SCION for inter-domain routing
   a. For the sake of discussion, assume the end-host will choose SCION by specifying a DAG of the form “XION: 123, HID: 456” rather than one of the form “AD: 123, HID: 456”
2. When a gateway router receives a packet with a XION destination domain, it will query the Path Servers and construct a SCION path to that domain
3. This path will then be added to the packet header as part of the XIA Extension Header
4. The gateway router and all subsequent routers in the domain forward packet to the first egress router
5. Egress router sends it to the next domain’s ingress router
6. Repeat this until packet eventually reaches the final destination AD’s ingress router
7. Routers within the final destination AD then forward packet to the final destination HID/SID

XION Principal Type:
Point to SCION Header in XIA Extension Hdr

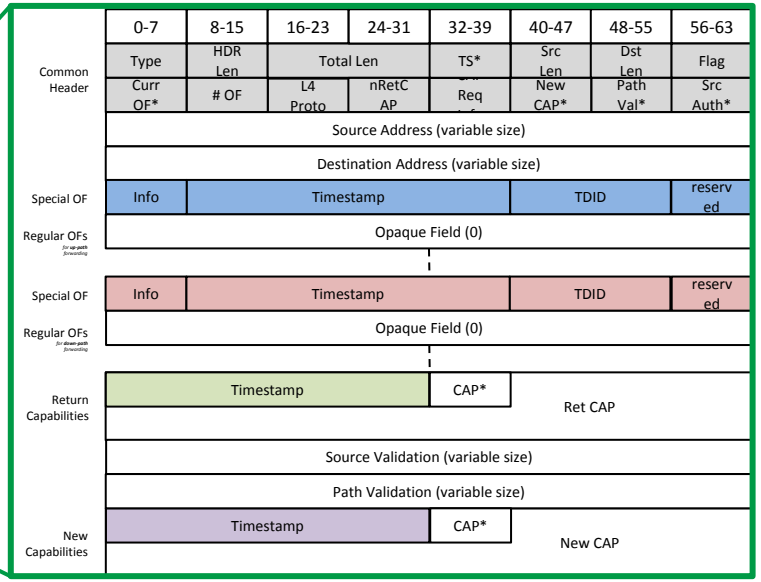


If Source needs ***Explicit Trust*** **on the Path (Network)** to HID

XIA Header



SCION Header



High-level integration plan

1. Update controller to add router forwarding table entries for SCION Certificate, Beacon, and Path Server SIDs
2. Bootstrap SCION by using existing SDN and XBGP routes to propagate PCBs, then construct and register resulting SCION paths
3. Update Click/routers to handle XION principle type
4. Update routers to query Path Servers and construct SCION paths
5. Update routers to insert SCION paths in XIA Extension Headers
6. Update routers to forward based on encapsulated SCION path egresses/ingresses

Questions

- Who is responsible for choosing the inter-domain routing protocol: end-hosts or domain controllers?

- Who keeps track of/assigns an AD's type (i.e. Core AD, Transit AD, Endpoint AD)?
  - For example, Endpoint ADs need to know the Core AD to register SCION paths with the TD Core's Path Server

- What are the limitations of the XIA Extension Header for storing SCION Headers?

- Have not done any SID routing thus far ⇒ possible issues with SID routing to reach a domain's SCION Certificate, Beacon, and Path Servers?

Scenario 1:

Scenario 2: