

Root initiated routing state in RPL

draft-ietf-roll-dao-projection

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Status to the draft

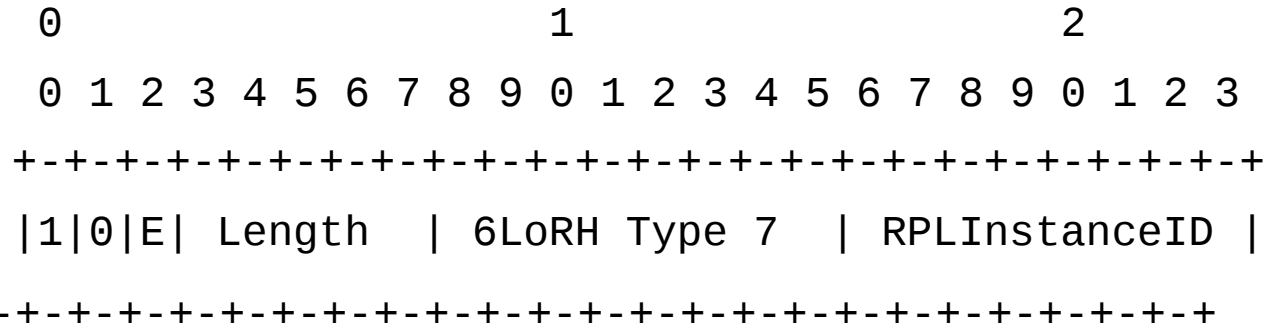
- Published -15 and -16 since last IETF
- Non-Storing Mode SRH may be loose
- Main DODAG MUST be Non-Storing Mode
- Track \Leftrightarrow Non-Storing Mode main DODAG:
 - Root is Track Ingress,
 - Signaled by one or more Non-Storing-Mode P-DAO messages
 - Track Ingress encapsulates external packets (as in useofrplinfo)
 - Track Ingress places the SRH in the packet in source routed tracks
 - There cannot be non-storing segments (only Tracks withing Tracks)
- Storing Mode P-DAO signals Segment of a Track or of main DODAG
 - Does not need re-encapsulation
 - Unless implicit Track \Rightarrow Do we support that ?



*See the VLA
Info Option as a
multihop Transit
Info Option*

Status to the draft (cont)

- RPI modified to indicate P-Route
- Extending RFC 6553 and RFC 8138



- New P-RPI-6LoRH, both elective and non-elective forms

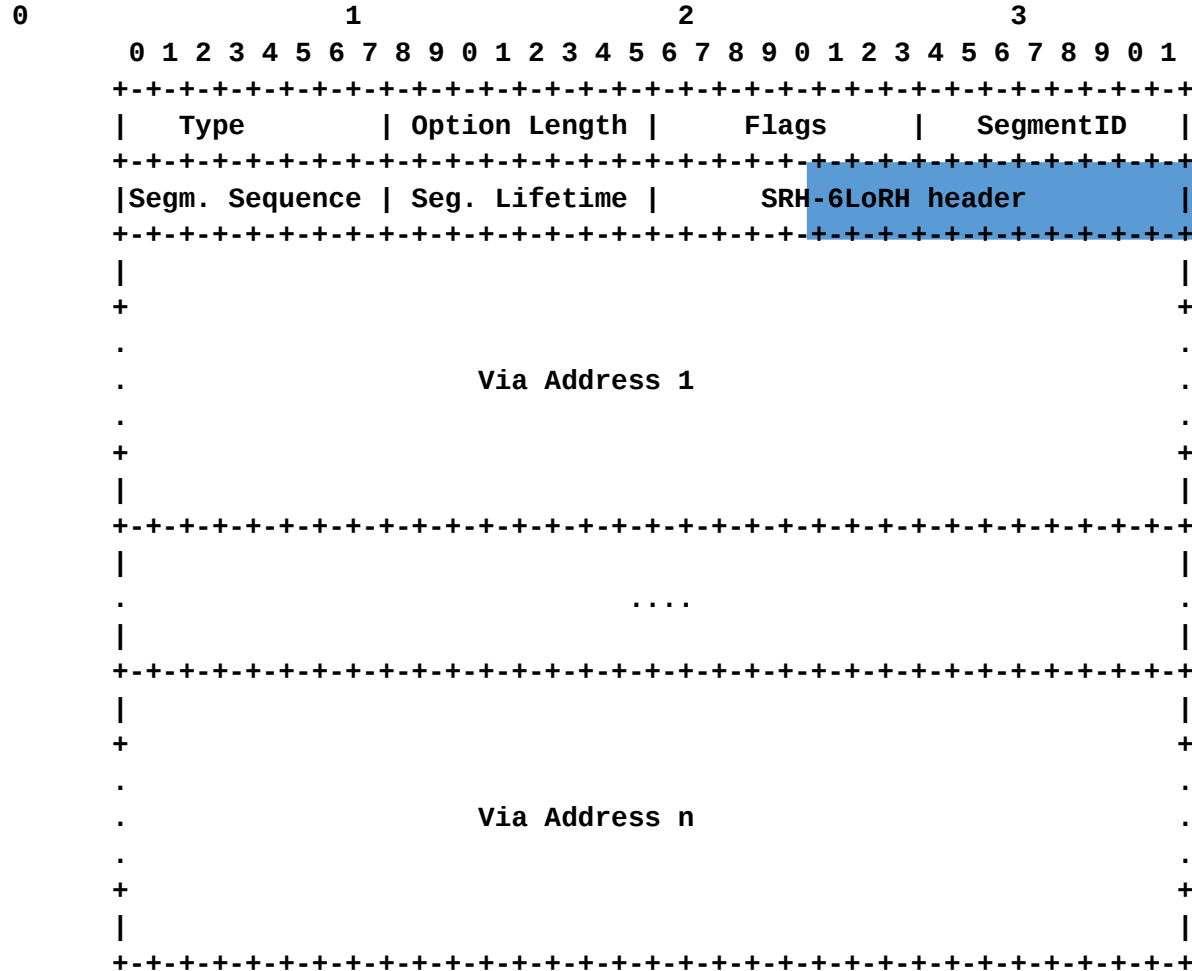
Encapsulation Rules

- Source of outer header MUST be Track Ingress
- RPL Instance ID in RPI MUST indicate TrackID (if not main DODAG)
- SR-VIO: Loose from Track Ingress, excluded, to Egress, included
 - Copied Verbatim in inserted SRH-6LoRH,
 - Requires encapsulation (can be recursive)
- SF-VIO: Strict from Segment Ingress to Egress, both included
 - No Encapsulation if Source and RPI both match Segment definition
 - A Segment is an Implicit Track if P-DAO Ingress == 1st SF-VIO entry
- TBD: matching rules, Flow Info option, when to tunnel?

P-DAO construction

- RPL Target Options can be factorized
- But there is one and only one VIO (SF-VIO or SR-VIO)
- So the Ack management is easier
- VIO sent to egress; SR-VIO sent to ingress
- Track ID is a RPL local instance ID
- Taken from the Track Egress Name Space

P-DAO Format



May be more than one in Non-storing Mode

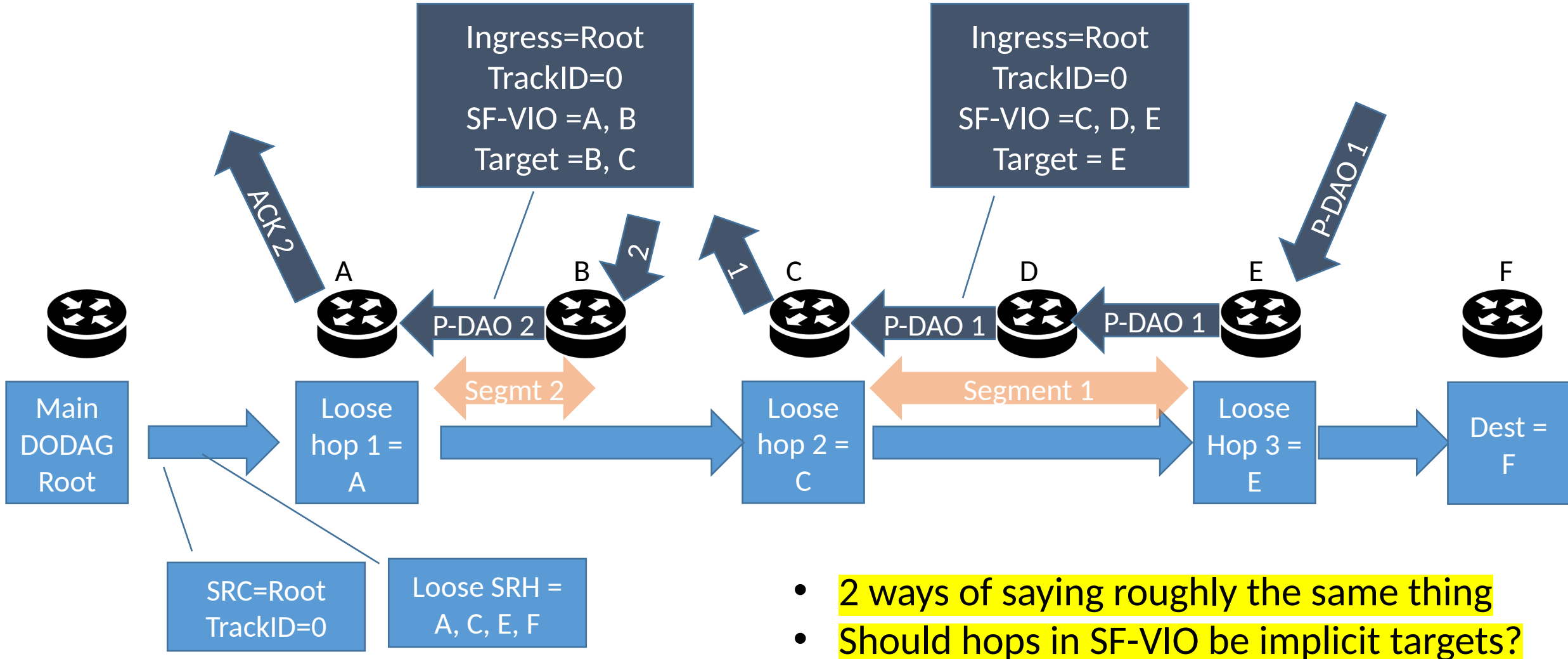
Must be optimized in Non-storing Mode, to be used as is in packets

Topology awareness

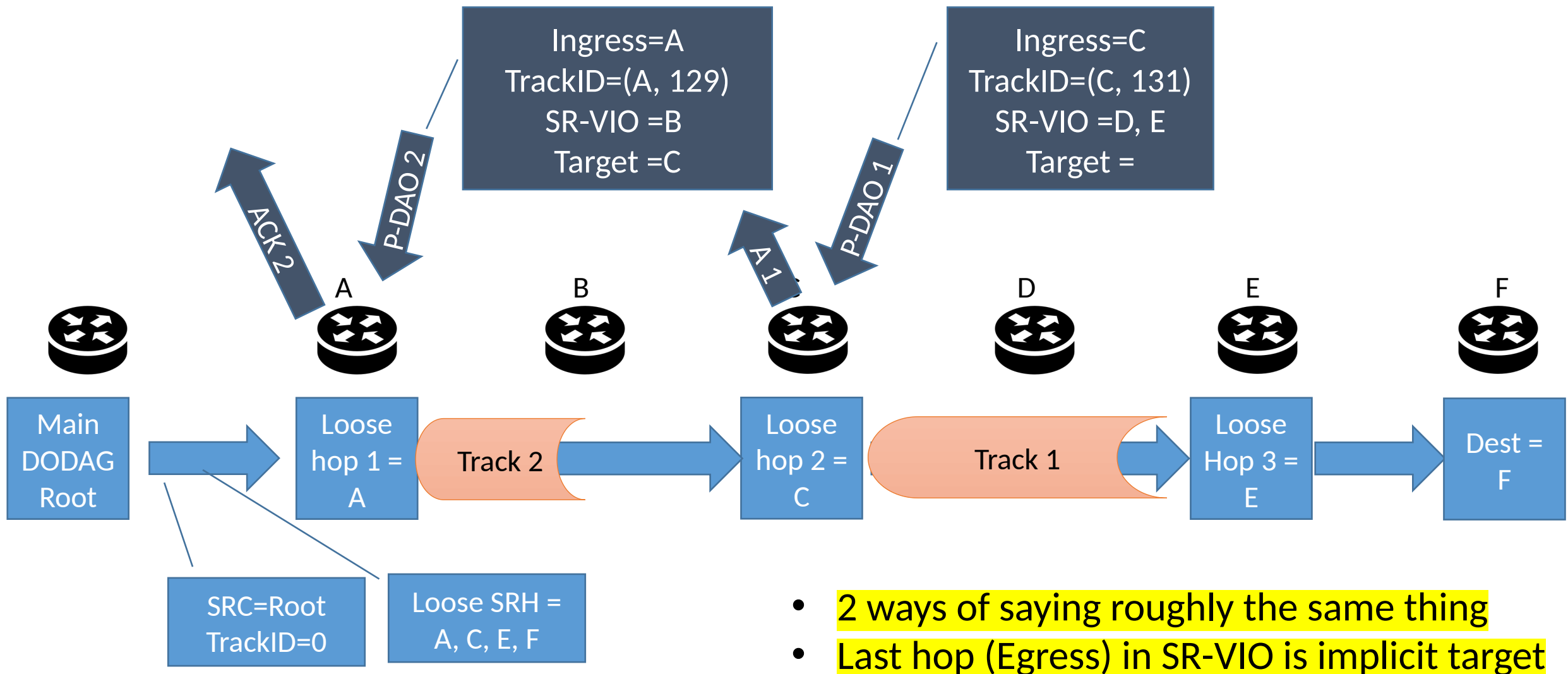
- Initially out of scope
- Now we have non storing mode + Sibling info option
 - Acronym conflict with RPL's Solicited Information Option
- Which sibling to advertise is still out of scope
 - Separate draft?

Profile 1:

Compress SRH in main DODAG with strict SM Segments



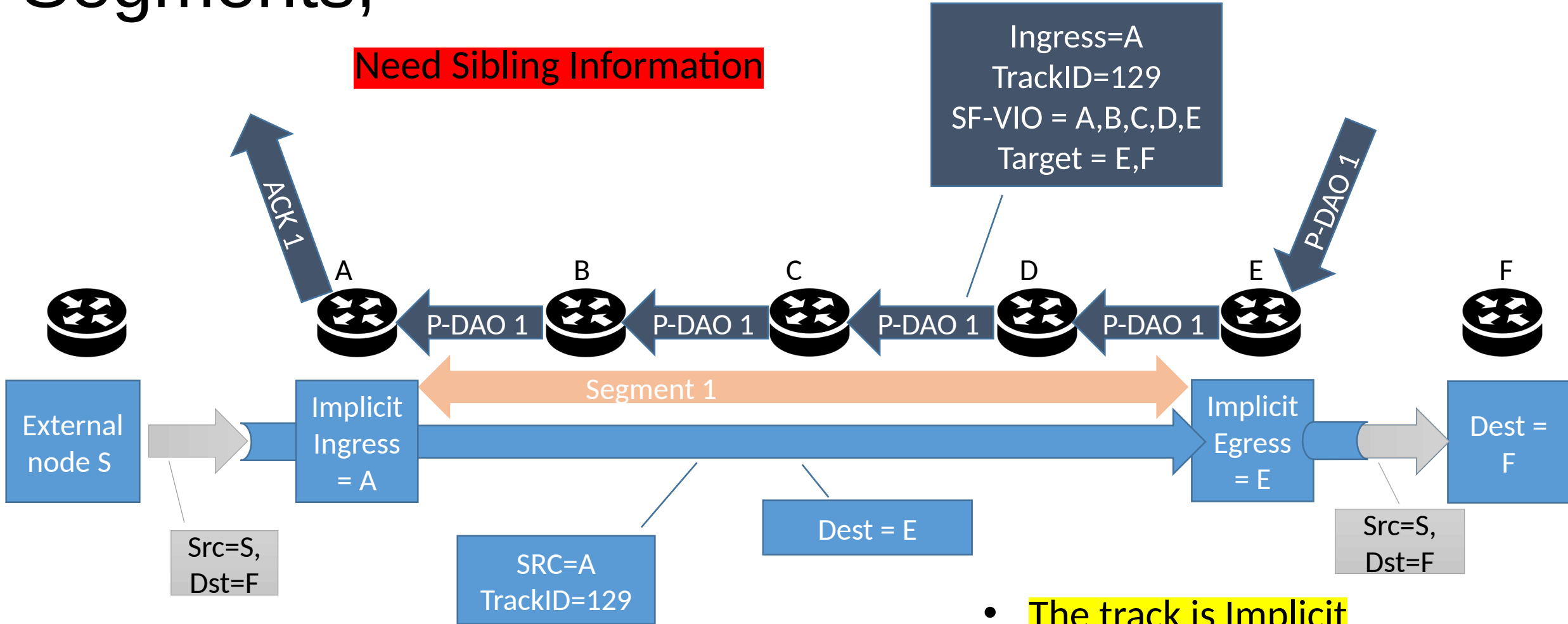
Profile 2: Compress SRH in main DODAG with Strict NSM Tracks



- 2 ways of saying roughly the same thing
- Last hop (Egress) in SR-VIO is implicit target

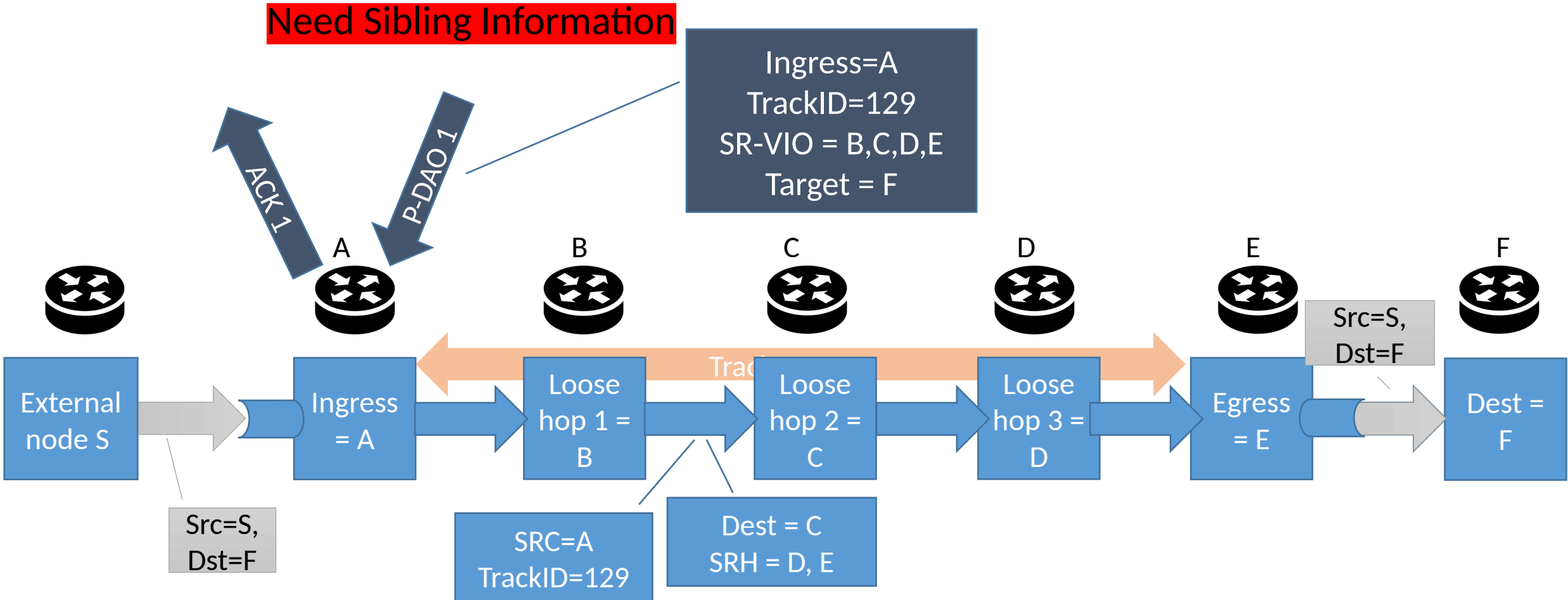
Profile 3: Implicit Track with Strict SM Segments,

Need Sibling Information



- The track is Implicit
- Can we inject packets along?

Profile 4: Strict NSM Explicit Track

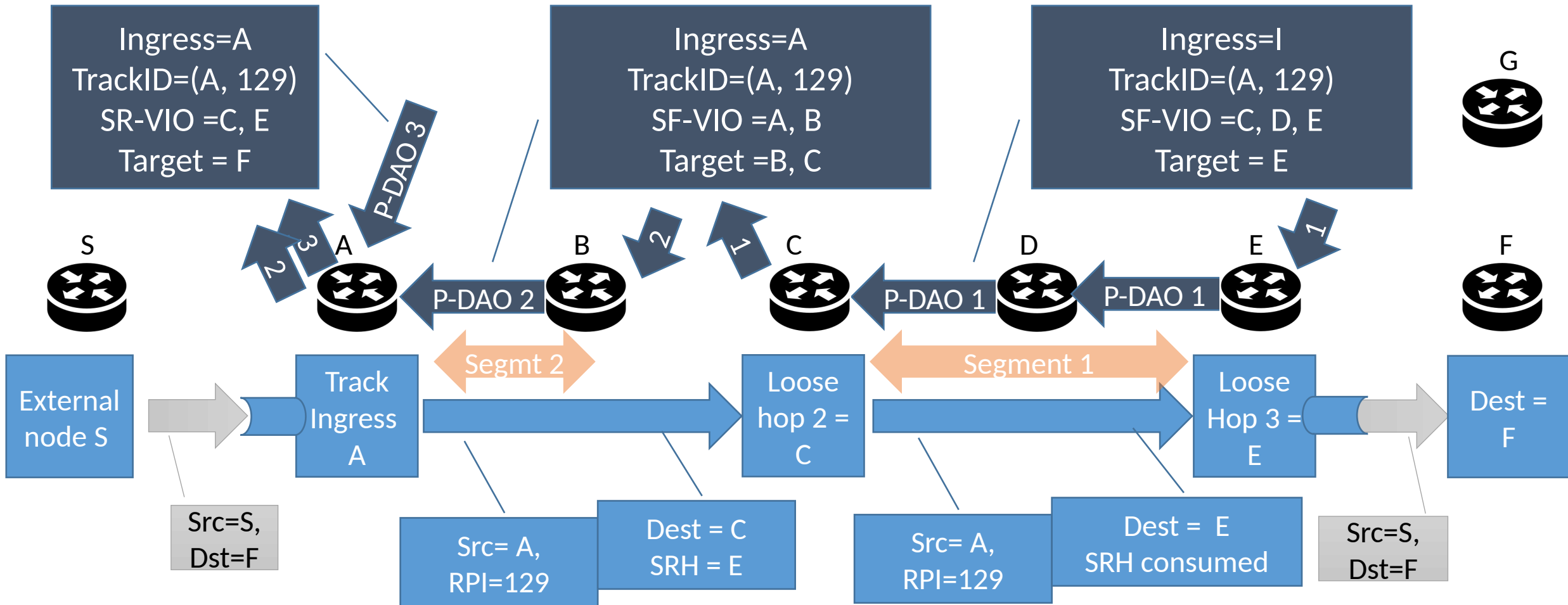


- **The track is Explicit**

Profile 5:

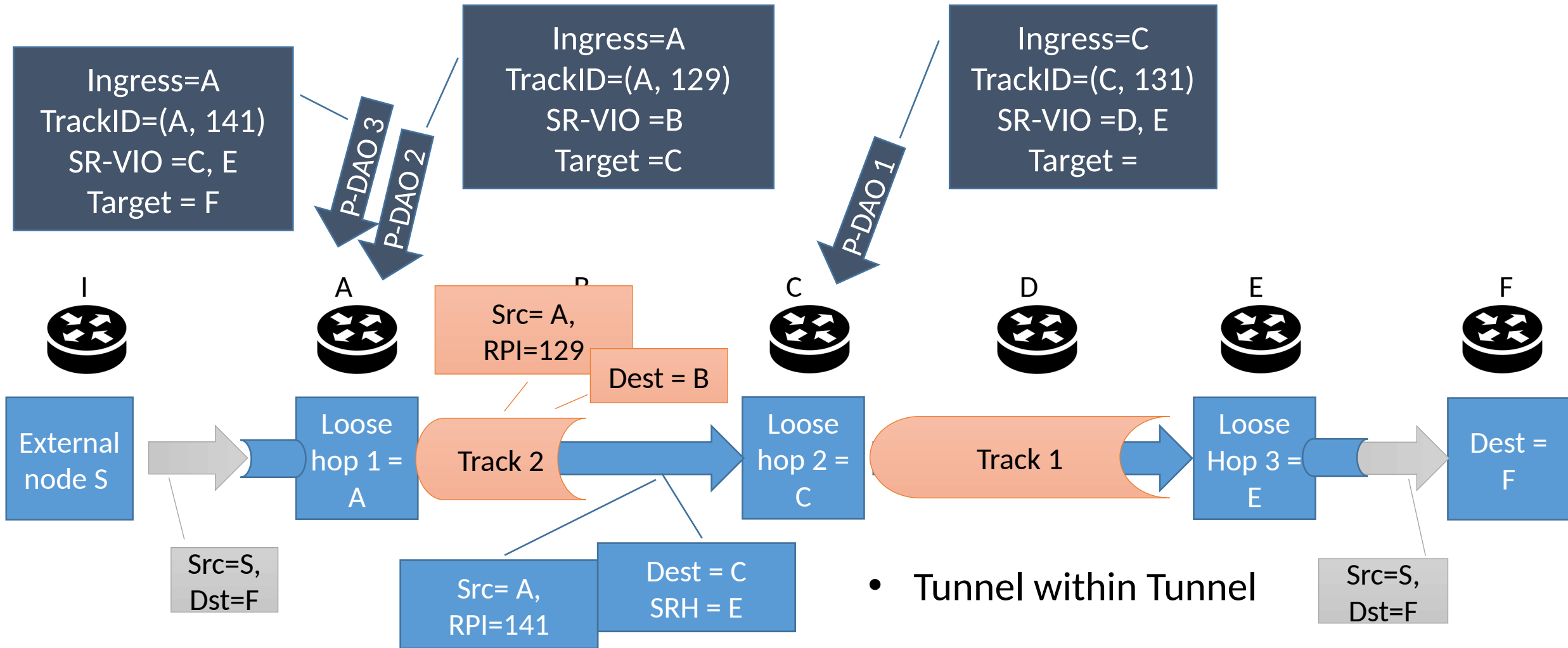
Need Sibling Information

Compress SRH in Track with Strict SM Segments



- Same as Profile 1, but for Track

Profile 6: Compress SRH in Track with NSM Tracks (Recursive?)



Huimin's comments / suggestions

- Lifetime unit: ReqLifetime, Track lifetime, and Segment Lifetime are defined as 8 bits. And their lifetime Unit is obtained from the DODAG configuration option. It will lead to inflexibility as all tracks in the PAN use the same lifetime unit. We propose to define lifetime unit separately for each track (for example adding a 2-bit flag to indicate second, minute, hour, day). Details can be discussed later.
- Now the TrackID has the same meaning as Local RplInstanceId. How does a node judge whether the received message is a P-DAO message or Local RPL instance DAO message? Is it possible to define a flag in the P-DAO message?
- The P-DAO track/segment is single-directional. I suggest to add the possibility for creating bi-directional segments/tracks. We can add a flag in the PDR message to indicate the requested track is single-directional or bi-directional.
- I suggest to add a flow of message exchanges for “PDR, PDR-ACK, P-DAO, P-DAO ACK” in the draft.

Other to be done

- Loop avoidance
- Who sends PDR? If it was destination, then it could select the trackID from its name space
- ND (RFC 8505) to maintain sibling neighbor state
- Be very specific if Ingress and Egress are listed in RPOs
 - Ingress to indicate which source address to use
 - Egress to build the full SRH 6LoRH

BAckup