802.1CS Link-local Registration Protocol:

Thoughts on options

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IEEE 802.1 Interim Meeting
May 2017, Stuttgart, Germany

Short Recap

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During the last IEEE 802.1 plenary meeting the editor of 802.1CS draft presented some proposals which could be considered as a role model for LRP ("Link Registry Protocol Options v2" by N. Finn)!

Proposals:

- **“IS-IS like“**
  Originally used to synchronize the Link-State-Database of IS-IS
- **“TCP like”**
  Originally used as a transport protocol to exchange a huge amount of data reliably
  - TCP/IP to make use of the already implemented IP-Stacks
  - ”TCP over Ethernet“ to avoid the necessity of an IP infrastructure

Recap on IS-IS mechanisms

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Current IS-IS LSP-Database synchronization mechanism depends on **three types of PDUs**:

1. **The Link State PDU (LSP) :**
   The LSP contains the actual data to synchronize. It gets retransmitted regularly dependent on the holdtime of the LSP or if the data changes. Furthermore every LSP has an unique ID and a checksum.

2. **The Complete Sequence Number PDU (CSNP):**
   The CSNP is a complete list of all currently registered LSP with it‘s IDs, sequence numbers and checksums.
   These get exchanged on a regular basis to ensure that no LSP got lost due to any failures.

3. **The Partial Sequence Number PDU (PSNP):**
   This PDU resembles CSNP but contain only a partial list of the currently registered LSPs.
   The purpose here is to acknowledge the receipt of one or more LSPs and/or to request the re-synchronization of one or more LSPs.

Some questions raise here for usage in LSP:

- IS-IS is centered around the synchronization of LSPs which carry TLVs. How would we map that to attributes?
  è Current proposal: Blocks, smaller than a PDU and comparable to LSPs carry the attributes/TLVs

- Also already mentioned by N.Finn: IS-IS has no mechanism to pace its transmission rate which is an important feature, especially for deployments of heterogeneous networks, where bridges with various performances are side-by-side.

Recap on TCP

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TCP depends at its core on the acknowledgement of the reception of data and retransmission in case of frame loss.

So what could TCP pay us?

- It has well-proven mechanisms to pace its transmission rate (throttling)
  (through: flow control, congestion control and window scaling).
- It builds a reliable channel to the peer. e.g. frame loss is handled by TCP.
  (through: three-way-handshake, sequence numbers, acknowledges and resend of lost data)
- It eliminates the limitation to the frame size (semantically)
- It has mechanisms to handle multiple applications to the same peer at once (through port numbers)
- It also has an optional Keep-Alive feature (RFC1122 p. 101)
- It has proven to work very well to transport large chunks of data

But TCP is completely lacking mechanisms to synchronize databases in an consistent way!

Some thoughts on TCP/IP

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As already stated (by "Link Registry Protocol Options v2" by N. Finn) there are a lot of prerequisites to get LRP based on TCP/IP up and running.

1. **Every bridge needs an IP-Address**
   IP requires it's own infrastructure which would also be a huge addition to the prerequisites of LRP.
   There exist L2-only networks (e.g. in industrial networks), which are not keen to introduce IP just to bring LRP up and running.

2. **Layering**
   It may be true that most Bridges already implement IP-Stacks for various reasons, but in my personal opinion it wouldn't be a good decision to rely on a L3 Service for a protocol which has the main task to be part of the L2 control plane.
   (Dependent on the application on top of LRP this could end in an Chicken and Egg problem:
   Imagine: To bring up the L2 data plane you need LRP which requires IP which requires a functional L2 data plane)

3. **Security issues**
   In principle IP would make every LRP-Participant accessible through any IP client.
   This raises a lot of security considerations compared to a pure L2-Peer-to-Peer-Protocol.

4. **Dependency on neighbor discovery**
   This would add further dependencies which we would get for free if we would stay at L2 and choose the right reserved multicast MAC address.

Take the best of both worlds!

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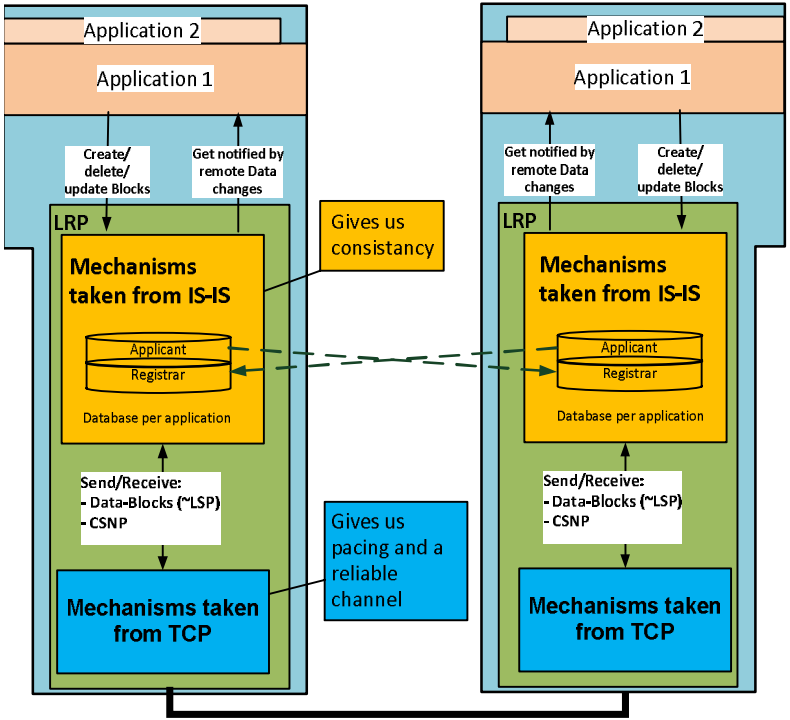

Take out of IS-IS for LRP:

The well-proven techniques of IS-IS database operations to establish consistency within an distributed database.

Proposed choice of IS-IS mechanisms for LRP:

- The structure of LSPs (ID, seqNo, checksum)
- CSNP (for Applicant and Registrar) to ensure consistency
- Probably: PSNP to request re-synchronization (not for acknowledgment)

Take out of TCP for LRP:

The well matured techniques of throttling and the better scaling acknowledging mechanisms of TCP.

Proposed choice of TCP mechanisms for LRP:

- The better scaling acknowledging mechanism of TCP (no 16 bytes per LSP as with IS-IS)
- For throttling / pacing of transmission (a light versions):
  - flow control
  - congestion control
  - window scaling
- Probably: Handling of multiple applications (through ports)

Thank You!

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Questions ?

Contact

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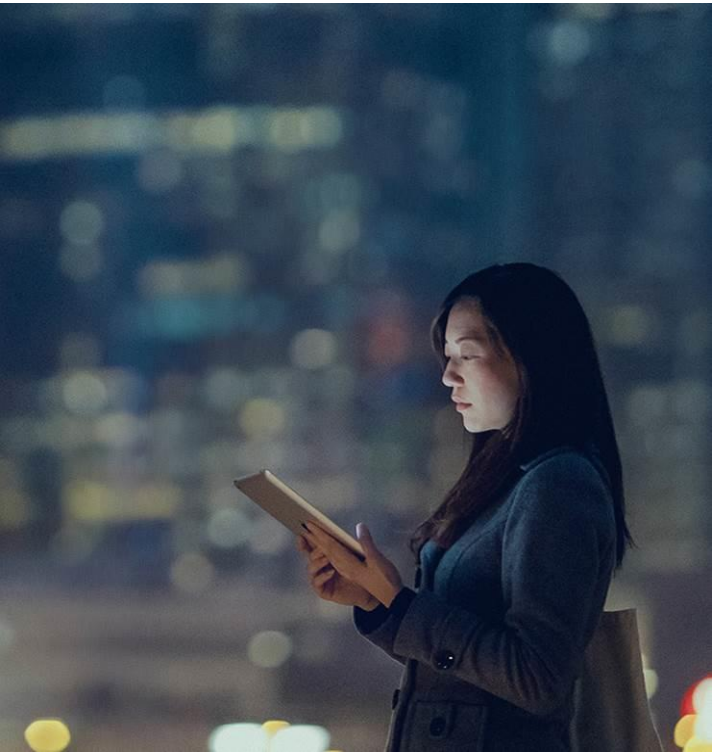

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