Industrial Use Cases for, Transport Issues of, and Security & Privacy Enhancements with In-Network Computing Systems

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In-Network Computing Systems

- **Potential Benefits**
  - Industrial Use Cases (draft-kunze-coin-industrial-use-cases-02)
  - Security & Privacy Enhancements (draft-fink-coin-sec-priv-00)

- **Implementation Challenges**
  - Transport Issues (draft-kunze-coinrg-transport-issues-01)

- **Content for today**
  - First steps towards realization
  - Thoughts on research group drafts
Potential Benefits – Industrial Use Cases

- Strategic Placement of Network Functions
  - Networked Control
  - Traffic Filters
  - Data Stream (Pre-)Processing
  - Industrial Safety
Potential Benefits – Industrial Use Cases

- **Latency Reduction**
  - *In-Network Coordinate Transformation*

\[
\begin{align*}
\rho \sin(\theta) \cos(\varphi) &= x \\
\rho \sin(\theta) \sin(\varphi) &= y \\
\rho \cos(\theta) &= z
\end{align*}
\]
Implementation Challenges – Transport Issues

- **Open Issues**
  - Addressing
  - Flow Granularity
  - Authentication
  - Security
  - Advanced Transport Features

- **First goal**
  - Achieve generic transport connection supporting and understanding changes in the network

<table>
<thead>
<tr>
<th>Addressing: IPv6 (Segment Routing)</th>
<th>Authentication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow Granularity: Datagram (SCTP)</td>
<td>Security</td>
</tr>
<tr>
<td>Adv. Transport Features: SCTP</td>
<td></td>
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</tbody>
</table>
Potential Benefits – Security & Privacy

- Legacy devices hard to update
  - Lack of security & privacy mechanisms
  - Sensitive data & processes

- Potential to retrofit within the network

- Manufacturer Usage Description (MUD)
  - RFC 8520
  - Idea
    - Enforce on P4 Switches
Next steps & RG drafts

- **Update drafts with new findings** (More feedback welcome 😊)

- **Research group drafts**

  - Condense/Collect information in joint RG drafts as a common research basis?

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**What is COIN?**
- kutscher-coinrg-dir
- Universal Definitions?

**Challenges/Requirements for COIN**
- **Data Discovery**
  - defoy-coinrg-mobile-discovery
  - mcbride-data-discovery-problem-statement
  - mcbride-edge-data-discovery-overview

- **Transport Issues**
  - kunze-coinrg-transport-issues

- **Management & Reservation Requirements**
  - liu-coin-differential-reservation
  - liu-coinrg-requirement

**Benefits of COIN**
- **Security & Privacy**
  - fink-coin-sec-priv

- **Industrial Systems**
  - kunze-coin-industrial-use-cases

- **App-Centric Micro-Services**
  - sarathchandra-coin-appcentres