A State Synchronization Working Group

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Most application networking protocols implement **State Synchronization**

FTP is about Synchronizing (the state of two peers)

- Van Jacobson

Examples: FTP, HTTP, POP/IMAP/JMAP, WebDAV, SIP, SCIM, COAP, LDAP, IPP, NFS, YANG Push, WebSub, ActivityPub, Matrix, Mercure, DNS, ALTO.

Also at other layers: OSPF, BGP, ROHC, IS-IS...

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But over time, we want:

- **Performance:** Realtime updates, pushed, delta-compressed, pub/sub
- **Collaboration:** Multiple editors over the network
- **Reliability:** Consistent vs. race conditions & machine failures
- **Decentralization:** New network topologies, offline peers
- **Versioning:** History, archiving, rewinding & playback

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But we also want:

- To not have to spec & implement it all ourselves
- To interoperate with other systems

Examples: a History of Sacrifices

FTP
POP → IMAP → JMAP
HTTP
  → WebDAV → CalDAV
  → JMAP
  → SCIM
  → SSE → ALTO
  → WebSub
  → Mercure
  → ActivityPub
  → Matrix
  → IPP
  → RESTCONF w/ YANG Push
  → PREP & Braid-HTTP
SIP
COAP

LDAP
NFS

NETCONF w/ YANG Push
ALTO → w/ SSE
DNS

ROHC
BGP
OSPF
IS-IS

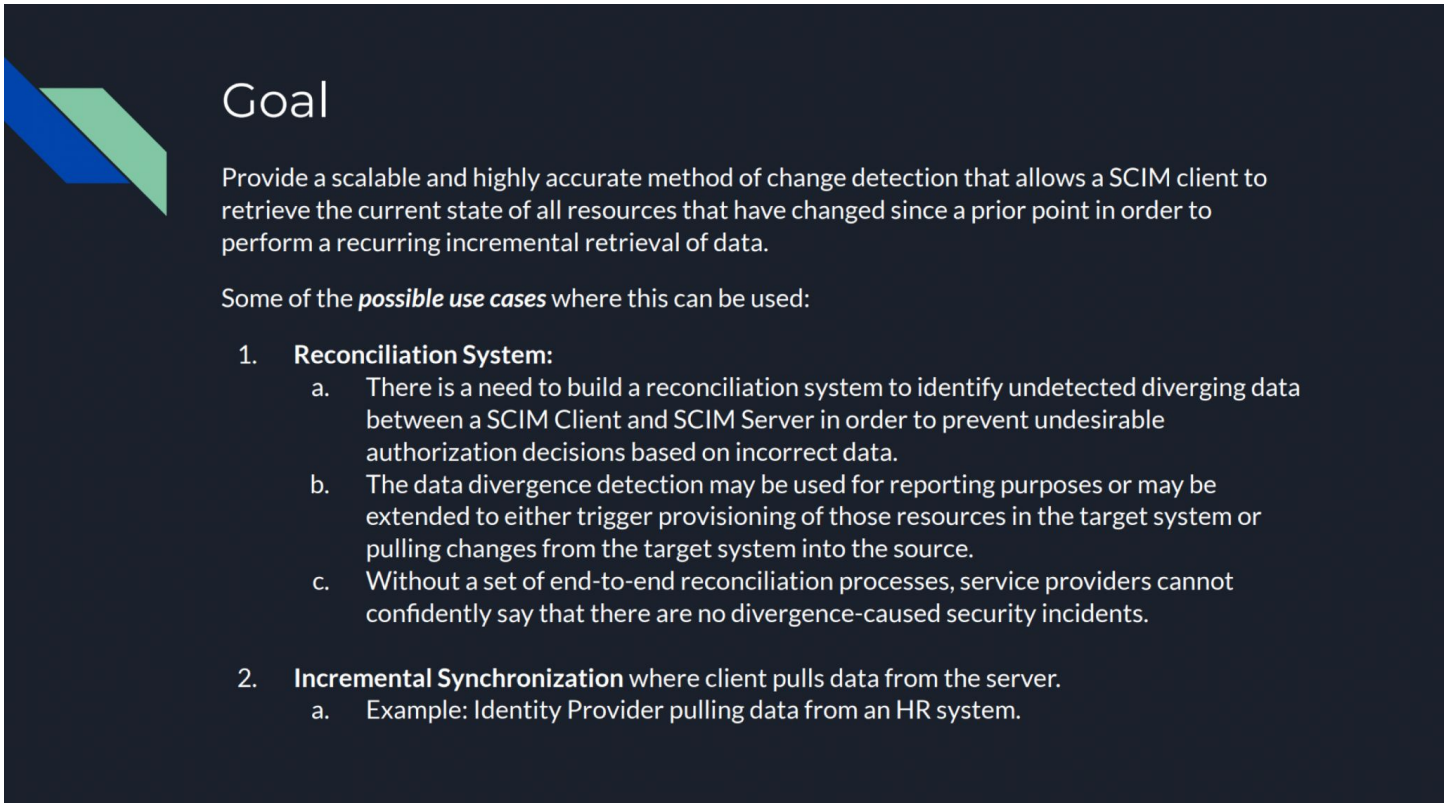
Example: ALTO Incremental Updates

RFC 8895
Application-Layer Traffic Optimization (ALTO) Incremental Updates Using Server-Sent Events (SSE)

Abstract

The Application-Layer Traffic Optimization (ALTO) protocol (RFC 7285) provides network-related information, called network information resources, to client applications so that clients can make informed decisions in utilizing network resources. This document presents a mechanism to allow an ALTO server to push updates to ALTO clients to achieve two benefits: (1) updates can be incremental, in that if only a small section of an information resource changes, the ALTO server can send just the changes and (2) updates can be immediate, in that the ALTO server can send updates as soon as they are available.

Example: SCIM Change Detection (IETF 117 in SF)



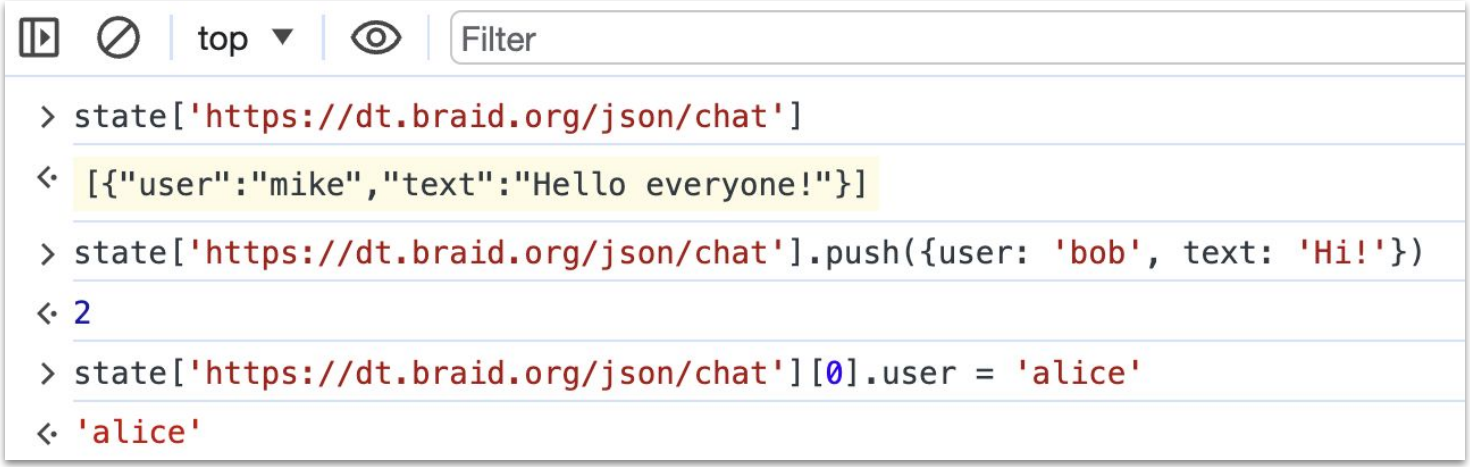
A State Synchronization Working Group

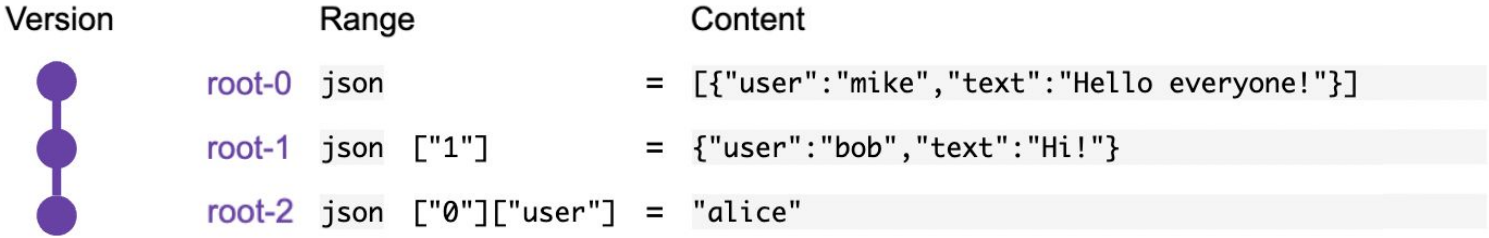
- **A place to solve the General State Synchronization Problem**
- Produces:
  - Abstract specifications
  - Common libraries
  - Concrete recommendations for other WGs
- Process:
  - Select features to adopt into group's scope of work
    - Start simple, then increase scope to **demand** and **doability**
  - Examine protocols → Create common models → Specify
  - Build and verify utility
    - Test interoperability with existing implementations
    - Propose concrete extensions for other WGs protocols

Example: **Braid.org** group and **Braid-HTTP**

- Braid.org: *informal* Working Group for Interoperable State Synchronization
  - Born at IETF 105, four years ago
- Four features solved in Braid-HTTP
  - Subscriptions
  - Patches
  - Version history
  - Merge consistency spec
- Multiple implementations:
  - Tested: Compatible with all existing CRDT & OT algorithms
  - Next: test compatibility with SIP, IMAP/JMAP, CalDAV, etc.
- Vision: to **read & write distributed state as easily as a local variable**

Result: Raise the level of Abstraction!





Conclusion: a State Synchronization Working Group

- Raise level of abstraction for both specifications and implementations
- Create a common reusable distributed state substrate
- Increase scope of features over time
  - *e.g.* live queries, consensus, validation, state-centric routing, low-level networking...

Question: Research Group vs. Working Group?

- Best standards come from marriage of **researchers** and **implementers**
- IRTF can do research, but not standards
- IETF can do standards, and include research