Evolution of the Subscription & Event Notification Drafts

IETF #97 Seoul

17-Nov-2016

NETCONF Charter Item 6:

"Enhance RFC 5277 with the ability to delete subscriptions without closing the client session, to modify existing subscriptions, and to have multiple subscriptions on a established client session. These changes should not affect older clients that do not support these particular subscription requirements. The RPCs and the data models in RFC 5277 should be converted to YANG

Authors on at least 1 drafts

Andy Bierman
Sharon Chisholm
Alexander Clemm
Balazs Lengyel
Einar Nilsen-Nygaard
Alberto Gonzalez Prieto
Hector Trevino
Ambika Prasad Tripathy
Eric Voit

+ Contributors

Yan Gang
Peipei Guo
Susan Hares
Tim Jenkins
Michael Scharf
Kent Watsen
Guangying Zheng (Walker)

Dezign™ Team

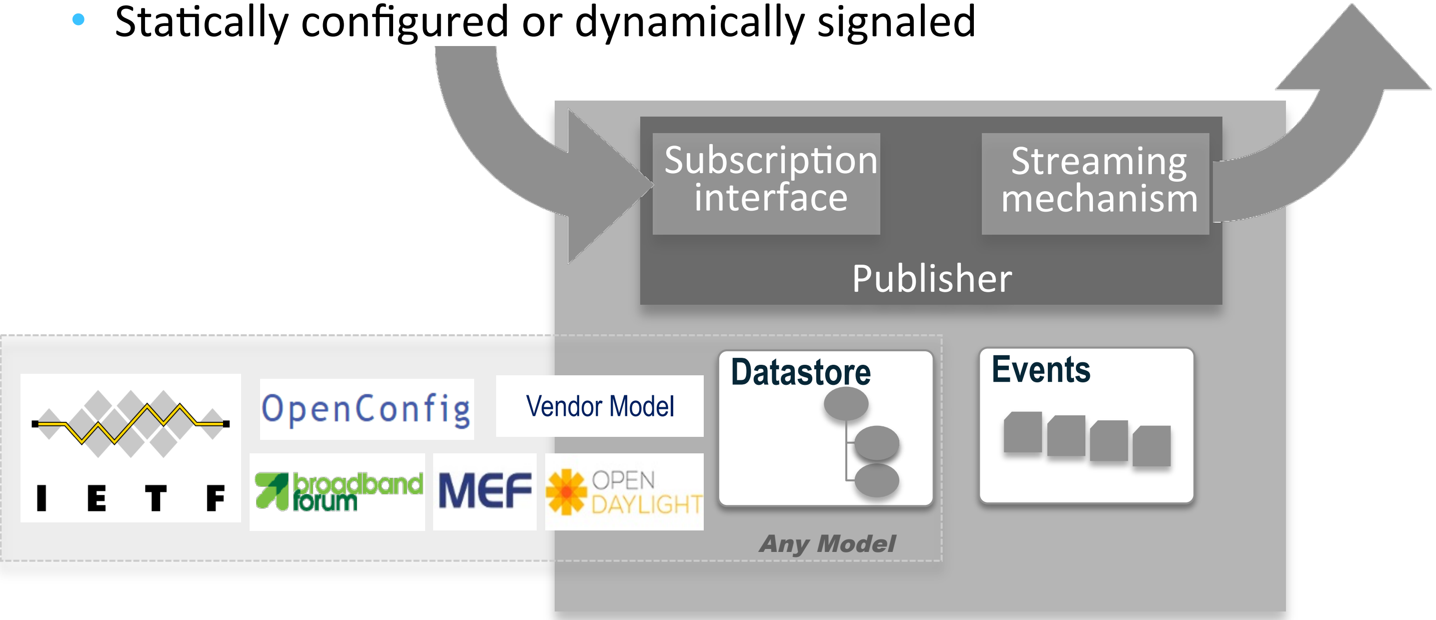
Event & YANG Subscriptions
Context

Subscribing to updates

- YANG Datastores
- NETCONF Notifications/Events
- Statically configured or dynamically signaled

Streaming of updates

- Customizable to recipient
- On-change, Periodic, Event



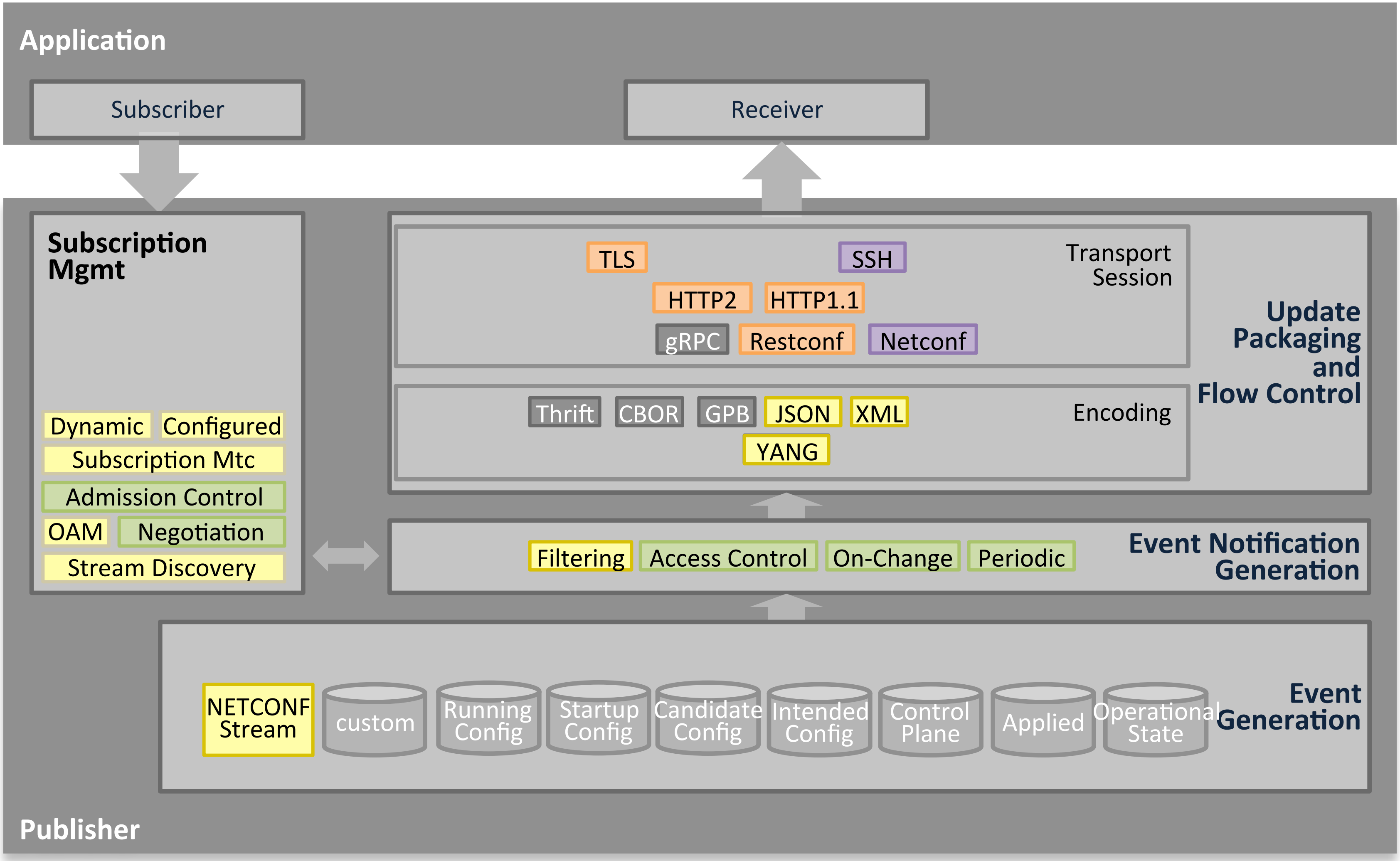
Event & YANG Subscriptions
4 Drafts

Subscription Mechanism:	**Subscribing to YANG datastore push updates** draft-ietf-netconf-yang-push-04
	Subscribing to Event Notifications draft-ietf-netconf-rfc5277bis-01
Choice of Transports:	**NETCONF Support for Event Notifications** draft-ietf-netconf-netconf-event-notifications-01
	RESTCONF & HTTP Transport for Event Notifications draft-ietf-netconf-restconf-notif-01

Github repository https://github.com/netconf-wg

- Minutes, Meeting Recordings, Terminology, Issues

4 Drafts in Layered Framework



yang push

Updates since IETF #96

- -04 revision
- Updates-not-sent flag added for incomplete push update
- Not-notifiable extension added for items where on-change not viable (via Metadata)
- Moved start/stop into rfc5277bis, added anchor time for periodic
- Dampening period is subscription, not per object
- Asynch refresh of full set of on-change objects
- Editorial updates, and material moved to 5277bis

Feedback Request #1

Simplifying streams and filter types

- Optional: Custom platform streams.
  - If used reduces set of objects for existing filters.
- Future: filters based on the intersection of OpState datastore fetch + Subtree + Metadata
  - can be used to accomplish objectives of streams
  - Predefined filters that reference a target datastore or filter contents based on metadata
- Request: Agree with above? If/when OpState adopted, charter new work so that corresponding filter-types exist. Who is interested in this topic?

yang push

Feedback Request #2

Topic Filtering

- YANG 1.1 identityrefs tagging existing objects
  - Could provide IETF standard inheritance
  - More efficient than content filtering
  - Could be used in conjunction with existing filters
- WG interest in classifying Model, Subtree, & Leaf via independent categorizations such as Event-type & severity?

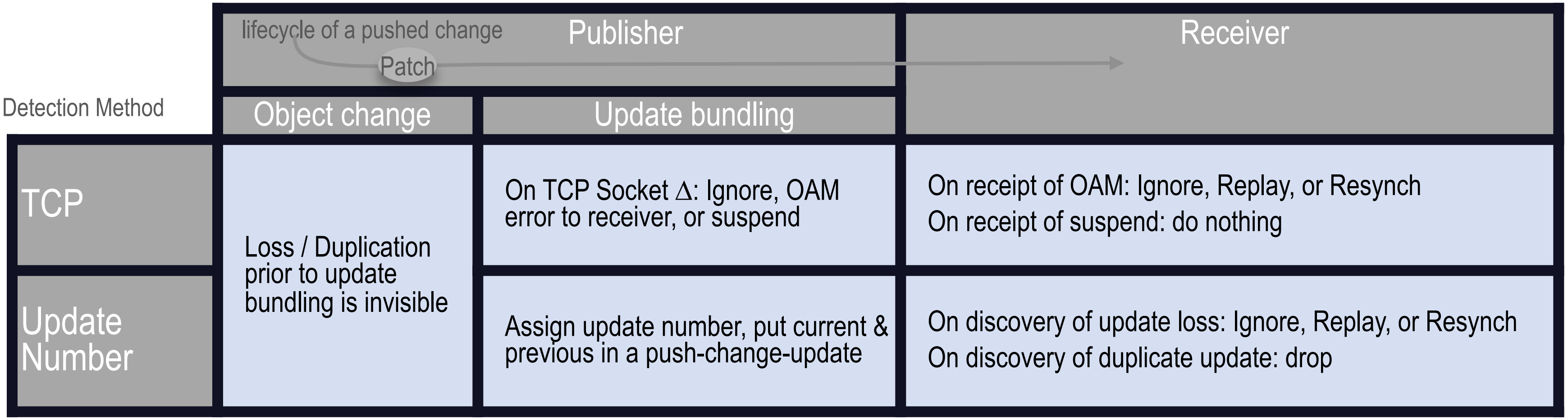
```
extension event-topic {
    argument id {

identity topic-id {
…
/********************************
example topic subtree
   + topic-id
     + service-topic
         + routing-topic
             + bgp-topic
             + isis-topic
********************************/

grouping topic-filter {
    leaf-list topic-filter {
        type identityref {
            base topic-id;

augment "/notif-bis:establish-subscription/notif-bis:input" {
    uses topic-filter;  }
```

yang push

Feedback Request #3

Optional Update-Number to Detect Loss/Duplication

- TCP can’t cover all cases for update loss & duplication of a push update.
- Request: Should we allow push-change-updates to include current & previous update number
  - Performance concern? Should this go in transport draft?



	Publisher		Receiver
Detection Method	Object change	Update bundling	
TCP	Loss / Duplication prior to update bundling is invisible	On TCP Socket Δ: Ignore, OAM error to receiver, or suspend	On receipt of OAM: Ignore, Replay, or Resynch On receipt of suspend: do nothing
Update Number		Assign update number, put current & previous in a push-change-update	On discovery of update loss: Ignore, Replay, or Resynch On discovery of duplicate update: drop

yang push

Next steps

Feedback Request #3	Should we include push-change-update number?
Open	Partial push of periodic updates in a subscription?
Open	YANG-Push statistics (e.g. counters of object changes, of update messages)

Simplify scope: Document and frame other follow-on work and potential augmentations

- Request #1: Future Filter Types, OpState, Metadata
- Request #2: Topic Definition and Filtering

5277bis

Updates since IETF #96

- -00 & -01 revisions
- YANG Model changes.
    - New groupings for subscription info to allow, restrict what is modifiable via RPC.
    - Removed notifications for adding and removing receivers of configured subscriptions.
    - Collapsed data model into single YANG module (ietf-event-notifications)
        - ietf-5277-netmod and ietf-5277-netconf were removed from notif-netconf draft
        - May need to "reverse" the split and pull out portions required for RFC 5277 backward compatibility (need separate namespace), e.g. create-subscription RPC
- Expanded/renamed definitions from event server to publisher, and client to subscriber as applicable.
- Cleaned-up wording, terminology, and redundancy

5277bis

Next steps

open	Scrub for completeness of error codes and diagnostics
pending	Split the current single model into two to keep the existing namespace for backwards compatibility with 5277.
pending	Move 5277 backwards compatibility objects into notif-netconf
pending	Definition of NETCONF & vendor custom stream types
pending	'Test-only' option to see if a subscription might be established

Restconf / HTTP2

Updates since IETF #96

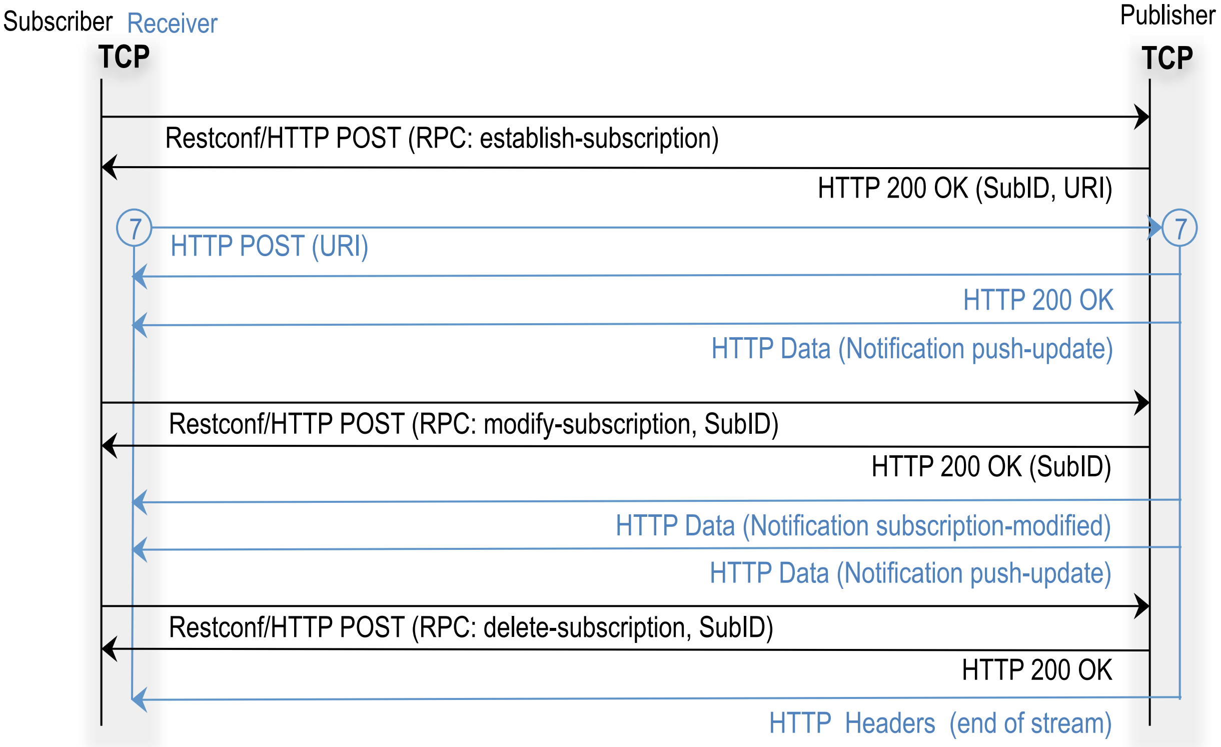
- -01 revision
- Single subscription goes to single HTTP2 stream.
- Updated call flows. Extensively.
- Shift to HTTP2 where available
  - SSE only used with Restconf and HTTP1.1 Dynamic Subscriptions
- Many clean-ups of wording and terminology

Restconf / HTTP2

Feedback Request #4:

HTTP2 compatibility with GRPC

Agree that adopting messages/exchanges for seamless transport over GRPC implementations? Who can provide extra eyes to validate proposed solution?


Subscriber
Receiver
TCP
Publisher
TCP
Restconf/HTTP POST (RPC: establish-subscription)
HTTP 200 OK (SubID, URI)
7
HTTP POST (URI)
7
HTTP 200 OK
HTTP Data (Notification push-update)
Restconf/HTTP POST (RPC: modify-subscription, SubID)
HTTP 200 OK (SubID)
HTTP Data (Notification subscription-modified)
HTTP Data (Notification push-update)
Restconf/HTTP POST (RPC: delete-subscription, SubID)
HTTP 200 OK
HTTP Headers (end of stream)

Restconf / HTTP2

Next Steps

Feedback Request #4	HTTP2 transport message compatibility with GRPC (need extra set of eyes)
open	Do we include 3rd party signaled subscriptions within models that need to be supported generically, or for a particular type of transport.

Notif-netconf

Updates since IETF #96

- -00 and -01 revisions
- Added Call Home in solution for configured subscriptions.
- Clarified support for multiple subscription on a single session. No need to support multiple create-subscription.
- Added mapping between terminology in [yang-push] and [RFC6241].
- Other editorial improvements.

Feedback Request #5

Notif-netconf

Ask Receiver to Call Home via a known Port

- Recommendation
  - For configured subscription, if no NETCONF session live to Receiver then Publisher initiates a Call Home to the Receiver on address and well-known port for subscription. Once session is established, Publisher sends "subscription-started" notification.
- Assumptions
  - Receiver is aware that calls on the configured port are intended only for pushing notifications.
  - Receiver is ready to accept notifications on the session as soon as it is established.

Notif-netconf

Next Steps

Feedback Request #5	Should Receiver Call Home to a well known Receiver Port?
pending	Move create subscription RFC to this document as it will only be used for NETCONF legacy.
pending	Express filter in JSON should be documented.

Join the Dezign™ Team

Andy Bierman
Sharon Chisholm
Alexander Clemm
Yan Gang
Peipei Guo
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Einar Nilsen-Nygaard
Alberto Gonzalez Prieto
Michael Scharf
Hector Trevino
Ambika Prasad Tripathy
Eric Voit
Kent Watsen
Guangying Zheng (Walker)

Meetings since IETF 96 Berlin (Wed 8AM Pacific)	
2-Nov-2016	Click for Notes, PPT, & Recording
26-Oct-2016	Click for Notes & Recording
19-Oct-2016	Click for Notes & Recording
12-Oct-2016	Click for Notes & Recording
5-Oct-2016	Click for Notes & Recording
28-Sep-2016	Click for Notes & Recording
14-Sep-2016	Click for Notes & Recording
7-Sep-2016	Click for Notes & Recording
31-Aug-2016	Click for Notes & Recording
26-Aug-2016	Click for Notes & Recording
17-Aug-2016	Click for Notes & Recording
10-Aug-2016	Click for Notes, PPT, & Recording
4-Aug-2016	Click for Notes, DOC, & Recording
27-Jul-2016	Click for Notes & Recording

Thank you!

Functional Partitioning

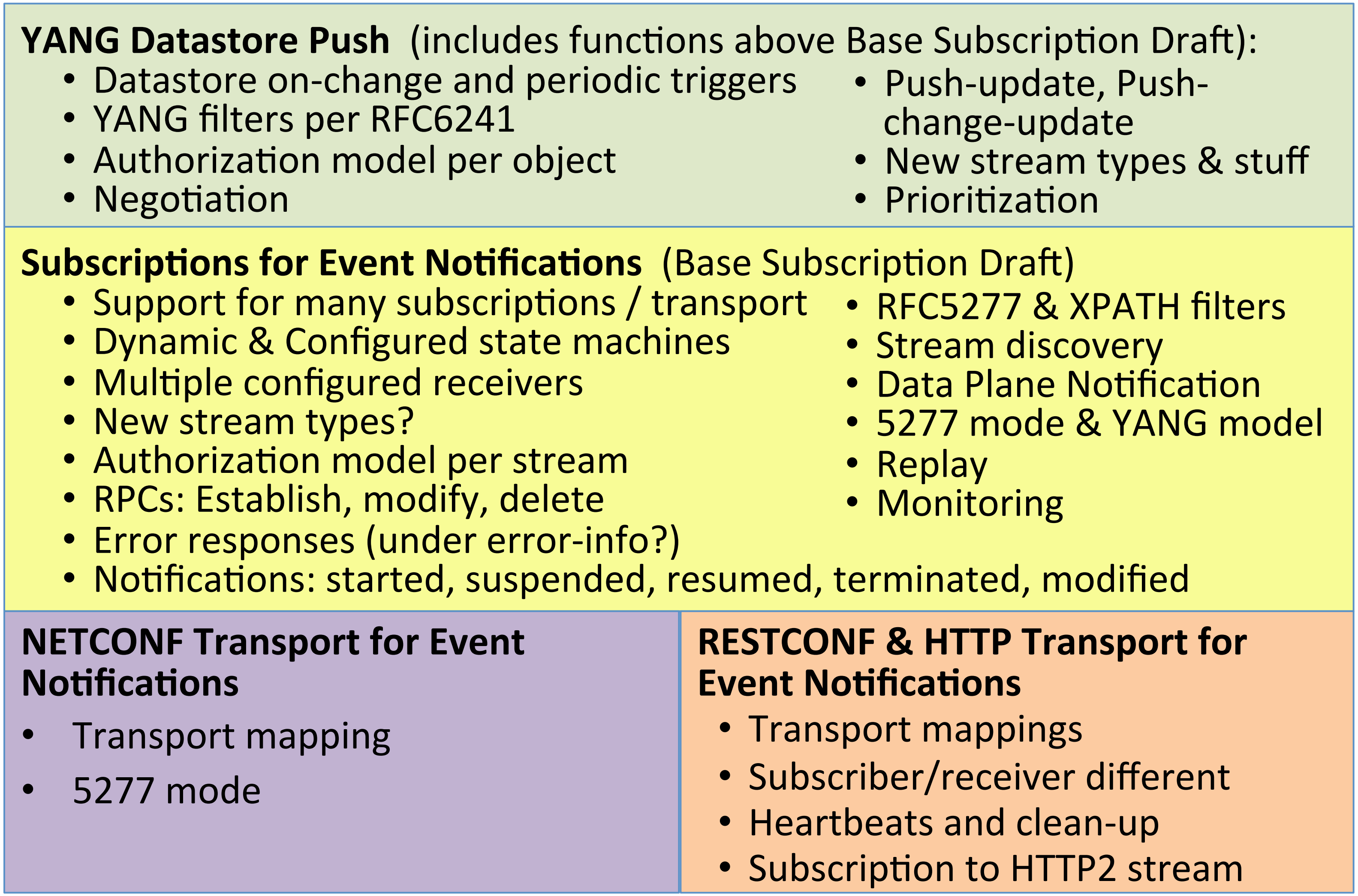
		Event Notifications		YANG Datastore Push
		5277 Mode	Enhanced	
Subscription	Types of Subscription	Dynamic	Dynamic and Configured	
	Subscriptions per Session	one	many	
	Negotiation	No	Yes	
	RPCs	create	establish, modify, delete	
	Control Plane Notifications	None	started, suspended, resumed, terminated, modified	
Data Plane Notifications		notification	+subscription-id	push-update, push-change-update
Transport	NETCONF	Yes		
	RESTConf, HTTP, HTTP2	No	Yes	

Legend

- 🟩 YANG Datastore Push
- 🟨 Subscriptions for Event Notifications
- 🟪 NETCONF Transport for Event Notifications
- 🟧 RESTCONF Transport for Event Notifications

Compatibility with RFC-5277 ⬚

4 Drafts Functional Partitioning



YANG Datastore Push (includes functions above Base Subscription Draft):

- Datastore on-change and periodic triggers
- YANG filters per RFC6241
- Authorization model per object
- Negotiation
- Push-update, Push-change-update
- New stream types & stuff
- Prioritization

Subscriptions for Event Notifications (Base Subscription Draft)

- Support for many subscriptions / transport
- Dynamic & Configured state machines
- Multiple configured receivers
- New stream types?
- Authorization model per stream
- RPCs: Establish, modify, delete
- Error responses (under error-info?)
- Notifications: started, suspended, resumed, terminated, modified
- RFC5277 & XPATH filters
- Stream discovery
- Data Plane Notification
- 5277 mode & YANG model
- Replay
- Monitoring

NETCONF Transport for Event Notifications

- Transport mapping
- 5277 mode

RESTCONF & HTTP Transport for Event Notifications

- Transport mappings
- Subscriber/receiver different
- Heartbeats and clean-up
- Subscription to HTTP2 stream