draft-duquennoy-6tisch-asf

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Overview

- ASF: Autonomous Scheduling Function
- 1) Autonomous slotframes
  - Slots based on a hash of neighbor's MAC address
  - Slots added/removed locally, no extra signaling
- 2) Slotframe per traffic plane
  - E.g. one for TSCH sync, one for RPL control, one for application
  - The length of each slotframe dictates per-plane capacity

New in version 01

- Based on
  - Feedback from IETF 99
  - ML discussions
- Added
  - Configuration parameters and procedure
    - Packet format to disseminate configurations (6P signal)
    - Traffic filters
    - Makes Hash function configurable (SAX remains default)
  - Burst mode (conditional cells based on ‘frame pending’ bit)

Configuration parameters

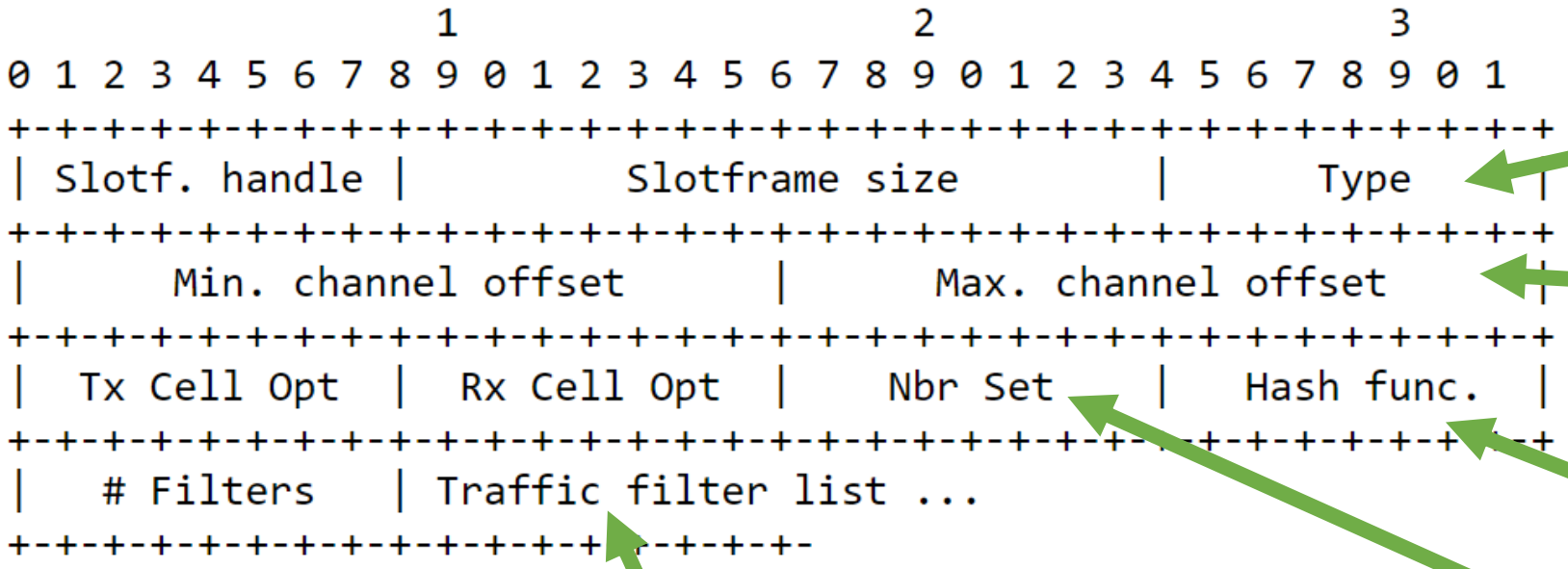


Figure 2: Format of the ASF SIGNAL slotframe descriptor.

Rendez-vous; sender-based; or receiver-based

Channel offsets assigned to the slotframe

SAX or something else

Empty; TSCH time sources; RPL parents; RPL preferred parent; or all IPv6 neighbors

Discussed next

Traffic filters

- Role: assign traffic to different slotframes

IEEE frame type

Unicast/broadcast

IP protocol
(0x3a: ICMPv6, etc.)

- If ICMPv6: type+code
- If UDP or TCP: port

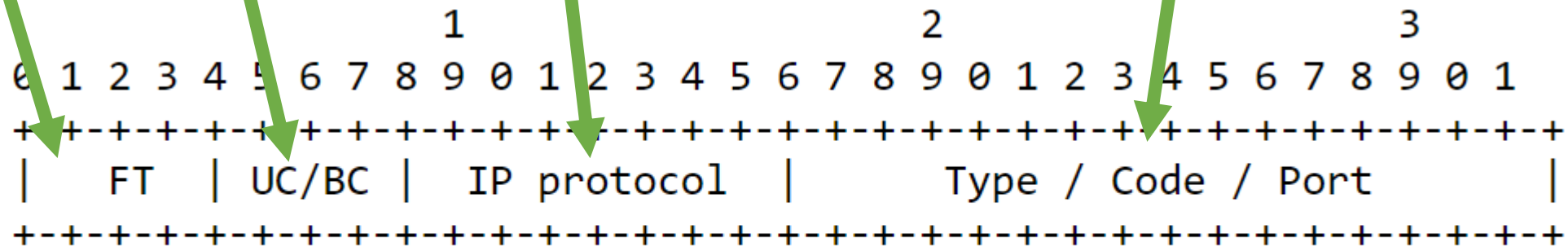


Figure 6: Format of the ASF SIGNAL traffic filters.

Config dissemination

- Configurations are embedded in a 6P SIGNAL IE
- The IE is included in EBs. Two cases
  - A subset of (secured) EBs include the config
    - First join, second wait for secured EB with config
  - All EBs (unsecured) include the config
    - Not sure if this opens new attack
    - Bootstrap with 6tisch minimal schedule is already unsecured

Burst mode

- Problem: in a given slotframe, ASF has only one cell per neighbor
- Solution: allocate consecuritve slots on-demand

- How: IEEE 802.15.4 ‘frame pending’ bit
  - Set when more than one packet ready to Tx
  - If ACKed, then send next packet in next timeslot, same ch offset
  - Stop condition
    - Sender: when buffer empty or no-ACK
    - Receiver: when ‘frame pending’ unset of no RX

Discussion

- Techincal
  - Initial dissemination in EBs: security
  - Burst mode: implementation issues?

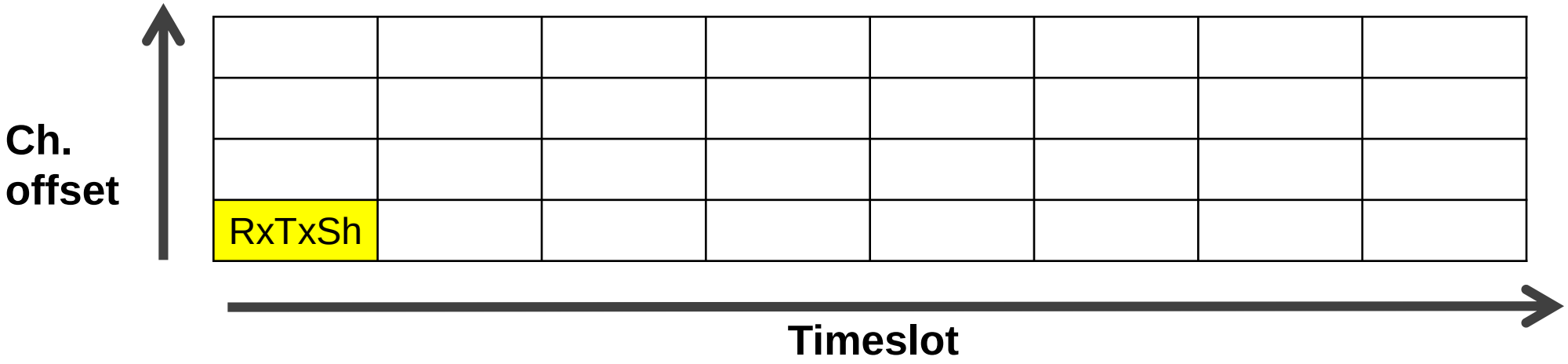
- Integration in WG. *From interim meeting minutes:*
  - Identify components, discuss how to best integrate
  - Cutting multiple ideas into smaller docs?
  - Integration with MSF?

Backup slides

- (copied from IETF 99, just in case)

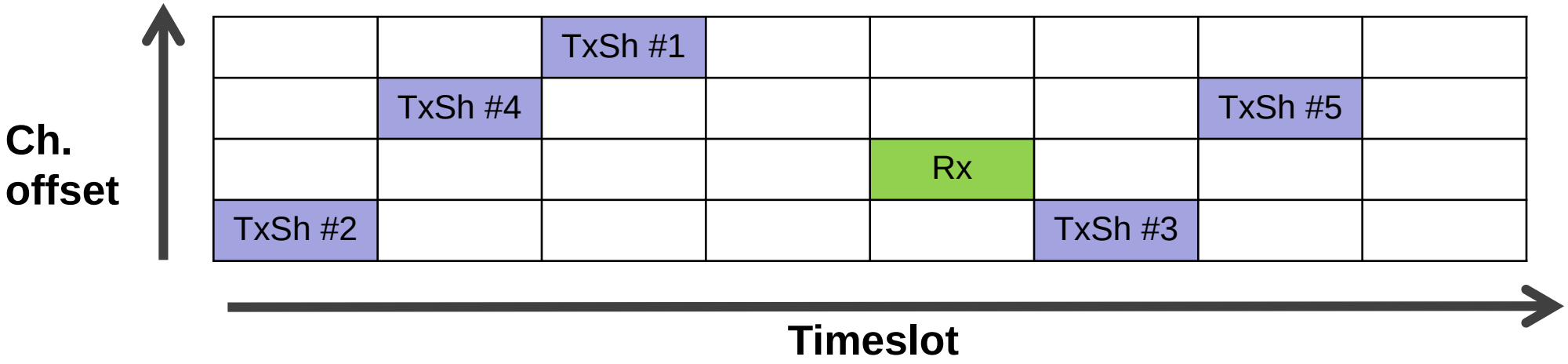
1/3: Rendez-vous slotframe

- Equivalent to 6tisch-minimal RFC 8180
- Used for rendez-vous
- E.g. RPL control, 6LoWPAN-ND, etc.



2/3 Receiver-based slotframe

- Nodes have one fixed Rx cell
- Nodes have one Tx (Shared) cell for each neighbor (IPv6 nbr cache)
- E.g. use for unicast to any neighbor



3/3 Sender-based slotframe

- Nodes have one fixed Tx (Shared) cell
- Nodes have one Rx cell for each neighbor (IPv6 nbr cache)
- E.g. use for received from a privileged neighbor, e.g. TSCH time source