Monitor Traffic Flow through In-band Network Telemetry (INT)

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Outline

- Goal
- The Header Structure
- Testing

Goal

- Understand how the packet is forwarded in the network.
- What to monitor?
  - The forwarding path
  - The length of queue in each switch
  - Time stayed in queue
  - Ingress Timestamp
  - Timestamp when the packet is first enqueued
- Users can select the information that they want to know.

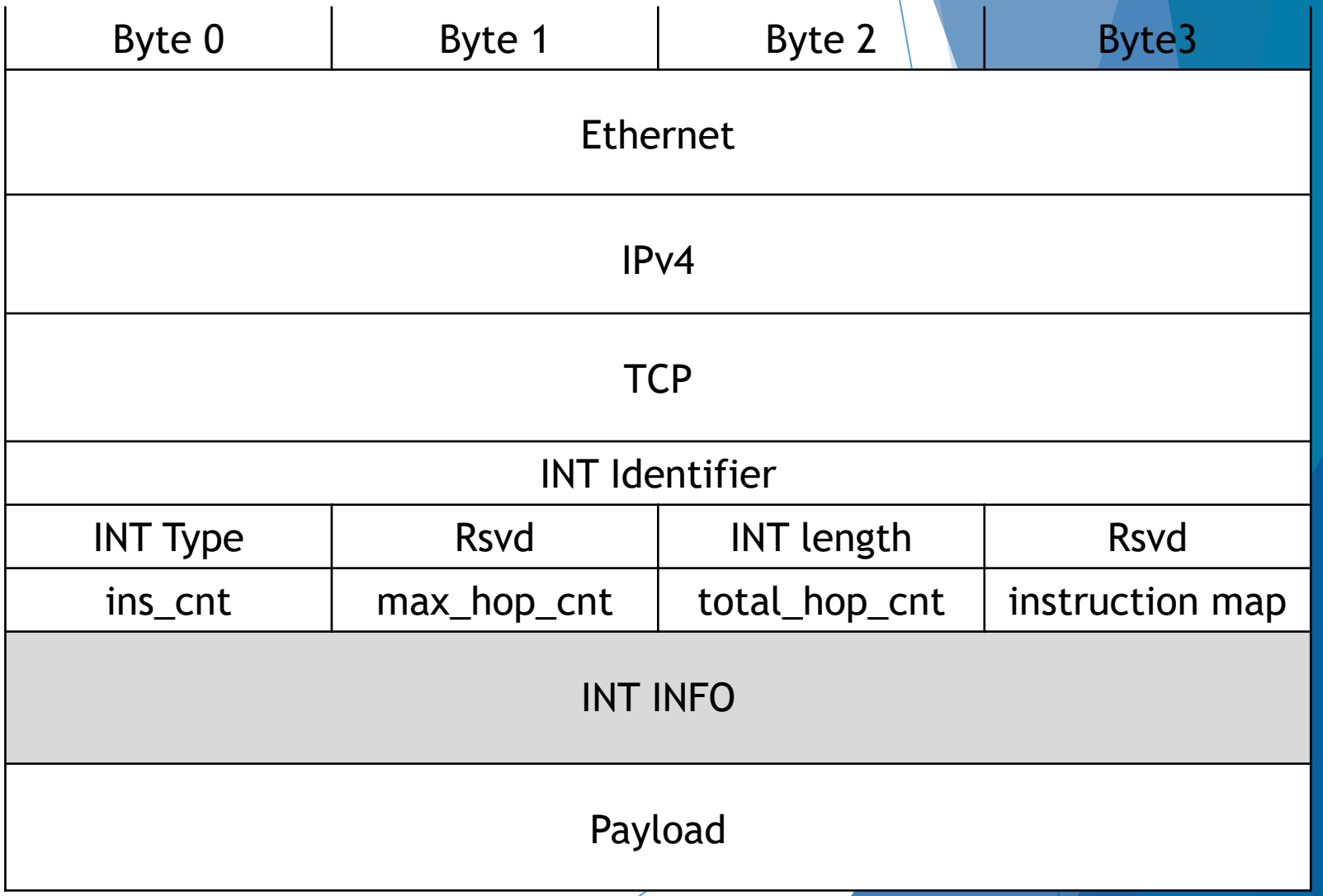
Header Structure

- INT Identifier <4 bytes>
  - 0 off / 1 on
- INT Type <1 byte>
  - destination based 0
  - hop by hop 1
- INT length <1 byte>
  - Size of INT data

Byte 0	Byte 1	Byte 2	Byte3
Ethernet			
IPv4			
TCP			
INT Identifier			
INT Type	Rsvd	INT length	Rsvd
ins_cnt	max_hop_cnt	total_hop_cnt	Instruction map
INT INFO			
Payload			

Header Structure

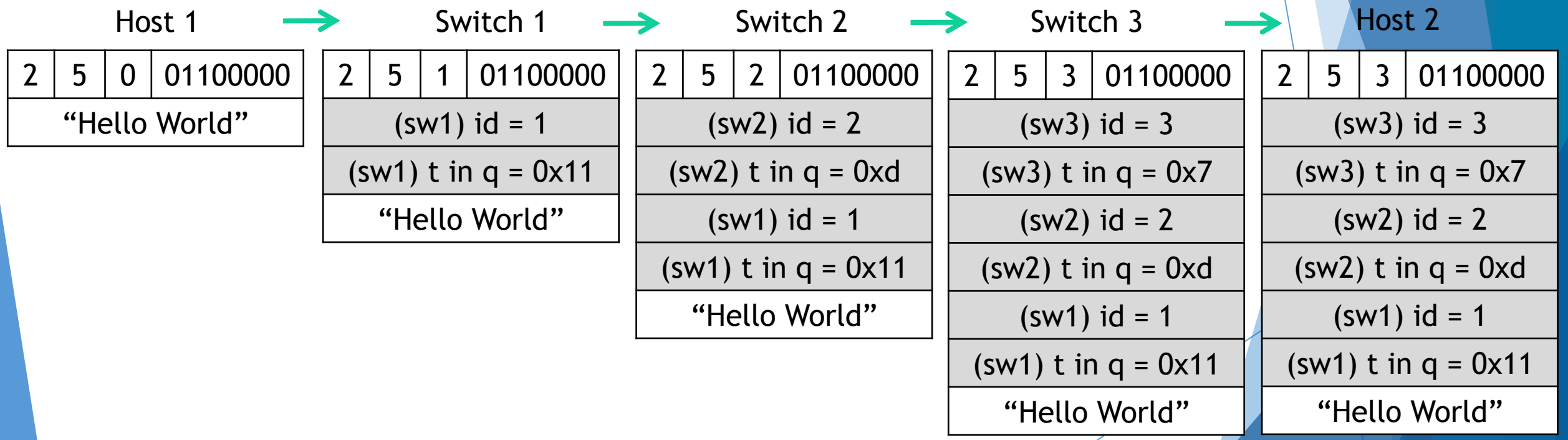
- ins_cnt <1 byte>
  - number of instruction
- instruction map < 1 byte>
  - e <1 bit>
  - inst0 <1 bit>
    - switch id
  - inst1 <1 bit>
    - time stayed in queue
  - inst2 <1 bit>
    - enqueued timestamp
    - Length of queue
  - inst3 <1 bit>
    - Ingress timestamp
  - rsvd <3 bits>

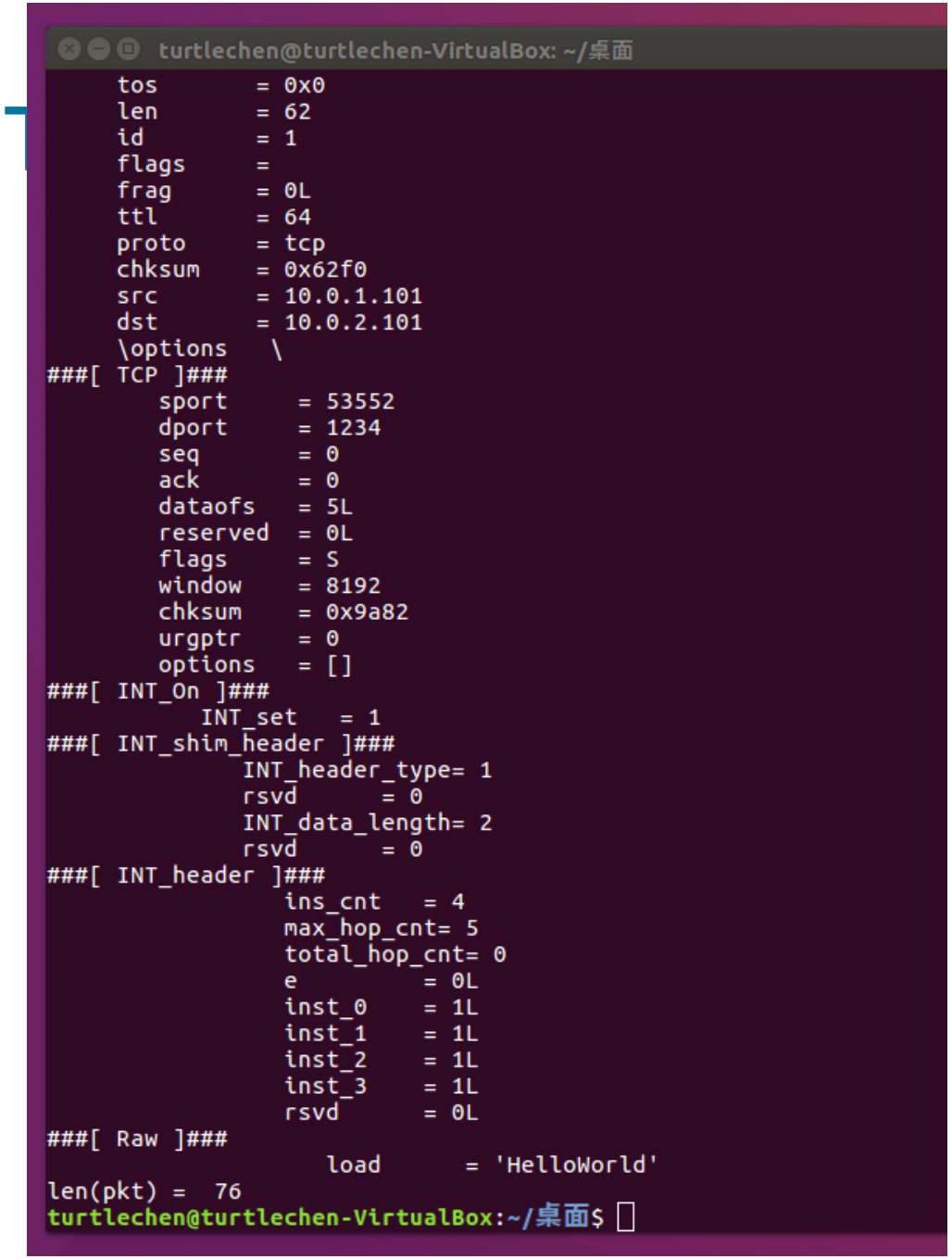


Example

ins_cnt	max_hop_cnt	total_hop_cnt	Instruction map
INT INFO			
Payload			

- The information that the user want to know will be stored in the ‘INT INFO’ field.






```
                inst_1    = 1L
                inst_2    = 1L
                inst_3    = 1L
                rsvd      = 0L
###[ Raw ]###
                   load      = '\x00\x00\x00\x03\x00\x00\x00\x0f\x9c\x83\xa5\x0
0\x01\x9c\x82\xf6\x00\x00\x00\x02\x00\x00\x00\x11\x9d+\xc8\x00\x01\x9d+(\x00\x00
\x00\x01\x00\x00\x00\x18\x9d\xd5\xf7\x00\x01\x9d\xd4\xc4HelloWorld'
len(pkt) =  124

###[INT info]###

Switch id =  00000003

Time in queue = 0000000f

Enqueue Timestamp = 9c83a5

Queue Length = 00

Ingress Timestamp = 019c82f6

######

Switch id =  00000002

Time in queue = 00000011

Enqueue Timestamp = 9d2bc8

Queue Length = 00

Ingress Timestamp = 019d2b28

######

Switch id =  00000001

Time in queue = 00000018

Enqueue Timestamp = 9dd5f7

Queue Length = 00

Ingress Timestamp = 019dd4c4

######

Payload =  HelloWorld

######
```