

# Losses in SATCOM systems : identification and impact

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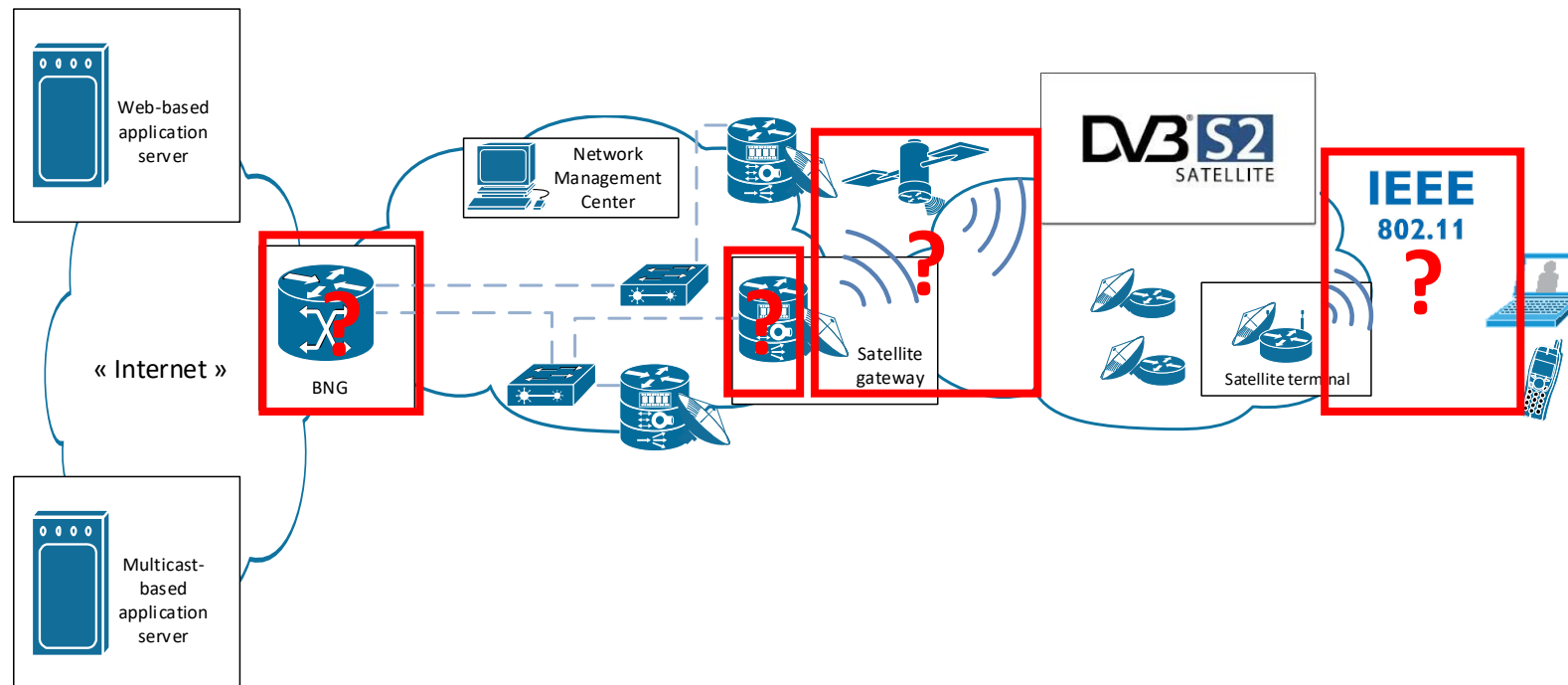
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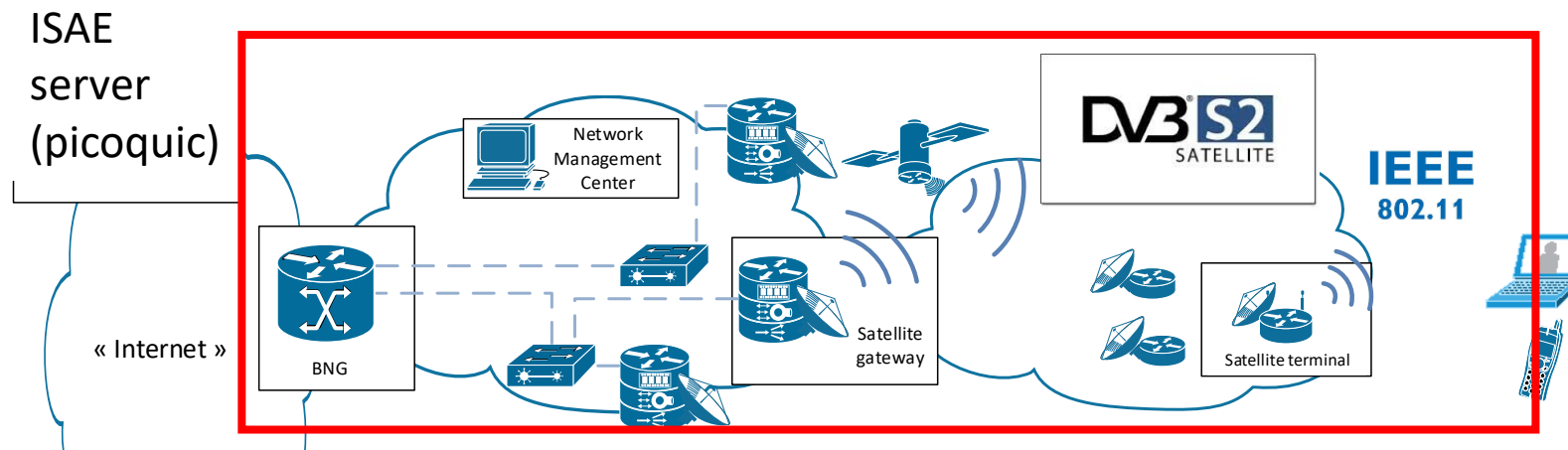
# Why focusing on losses ?

- SATCOM system split the reliability management with TCP proxies
- The emergence of QUIC traffic raises a question :
  - Where are the losses and how do they impact the transmissions ?



# Are there E2E losses in SATCOM systems ?

- End to end measurements on a real satellite public access

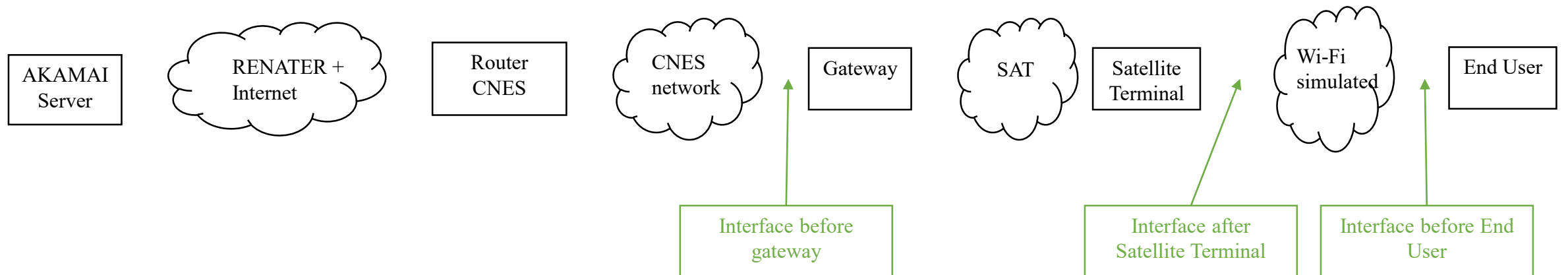


- Loss identified by missing QUIC packets are the receiver
  - Gilbert-Elliott model
  - Probability to go from « good » to « bad » state = 0.018 !

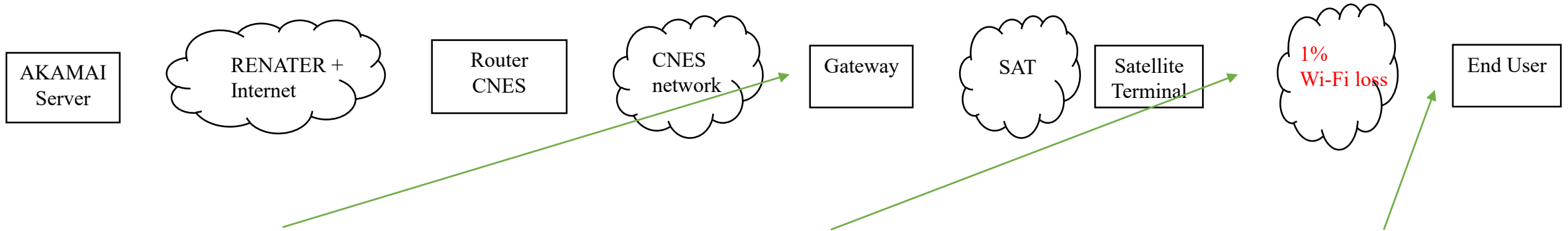
# Where are the losses ?

- Identification on the losses
- AKAMAI servers, IETF-QUIC traffic and a real (dedicated) satellite
- Loss identification based on the method proposed in

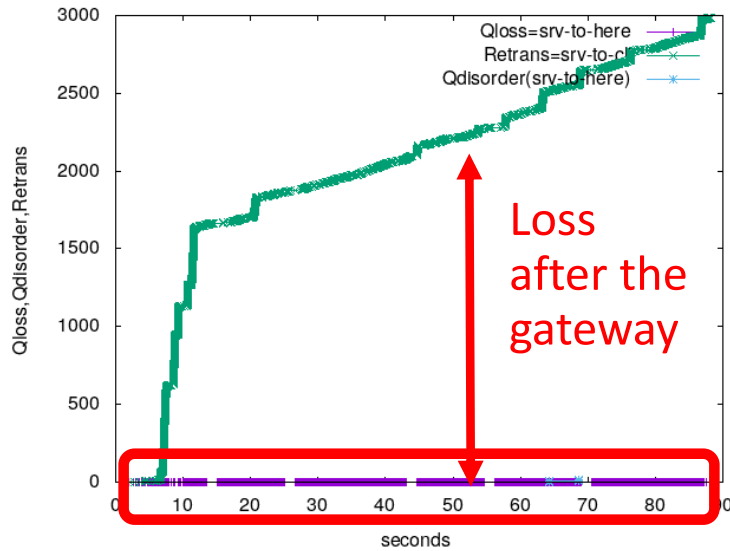
<https://tools.ietf.org/html/draft-ferrieuxhamchaoui-quic-lossbits-01>



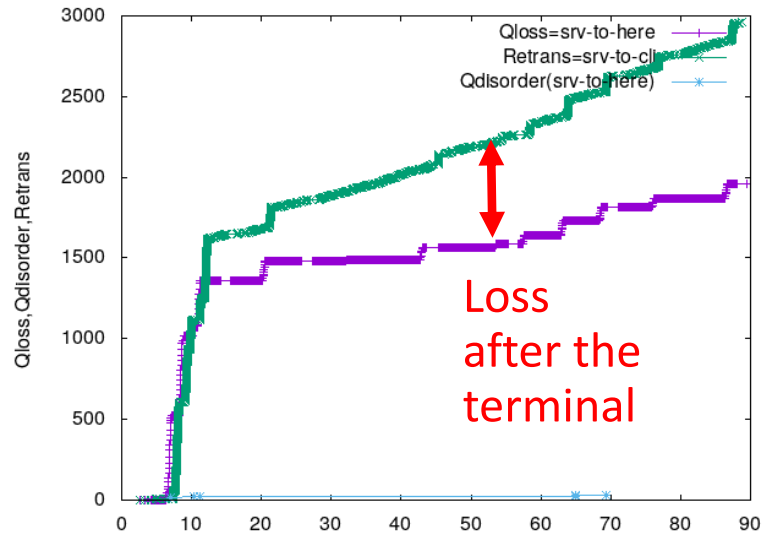
# Where are the losses ?



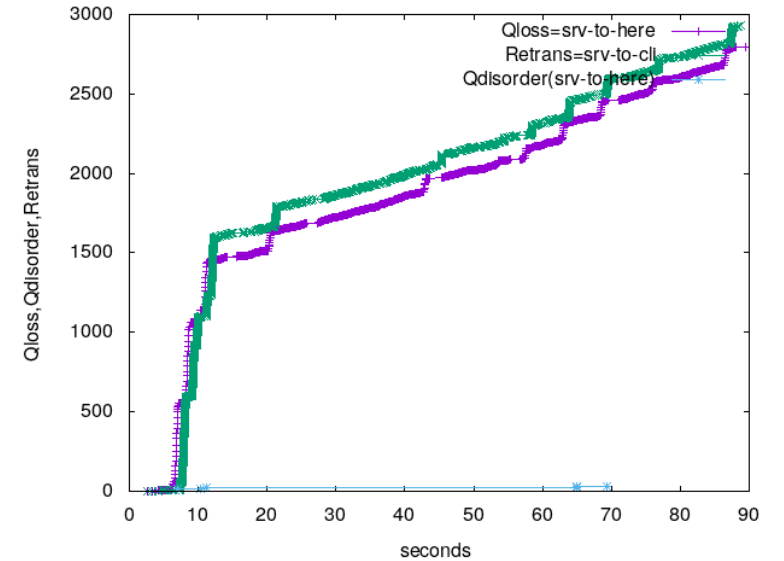
Loss-down out of 82082 packets:



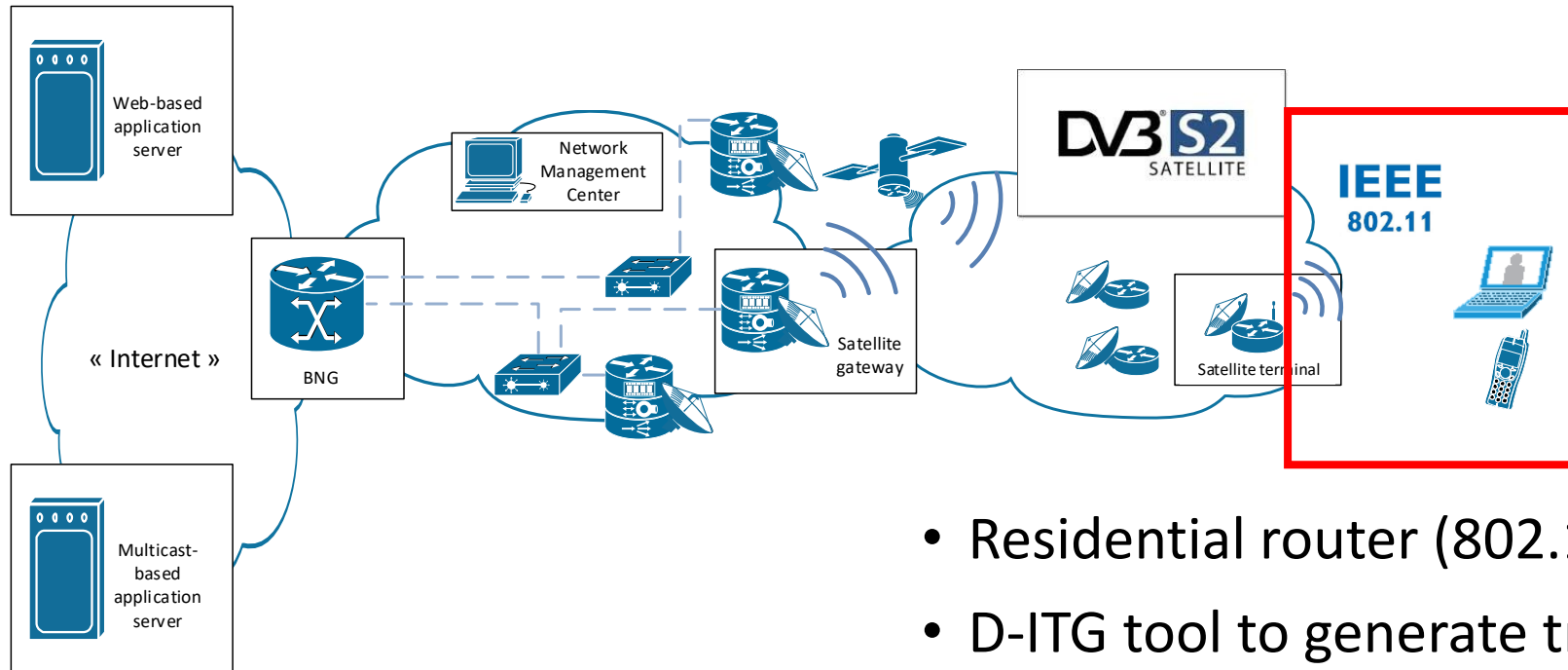
Loss-down out of 79928 packets:



Loss-down out of 79095 packets:

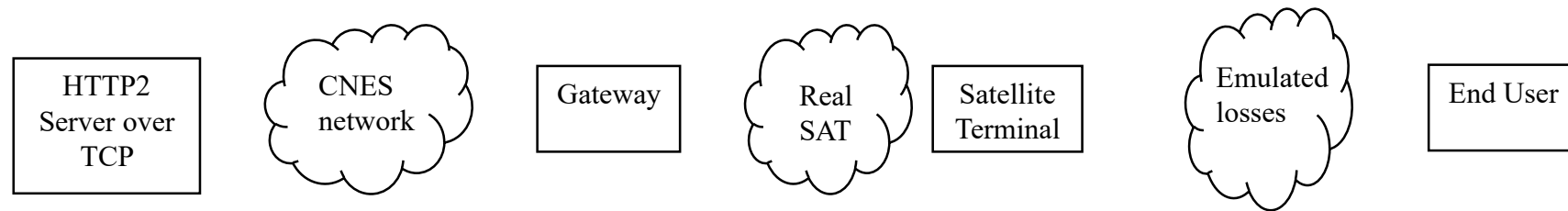


# Loss measurements on a residential Wi-Fi



- Residential router (802.11ac)
- D-ITG tool to generate traffic and collect metrics
- More than 9 million 1400 B packets
  - Average delay : 7 ms (with very high jitter)
  - Packet loss : 0.12%
  - Loss burst size : more than 2 packets

# Impact of E2E losses on a TCP flow



Loss ratio	Time needed to download 1 GB (s)	Goodput (Mbps)	Loss impact (1- Goodput-loss/Goodput-noloss)
0	797	10	0
0.0001	935	8.5	0.15
0.0005	1528	5.2	0.48
0.001	1863	4.2	0.58
0.005	7140	1.1	0.89

- Experimental evaluations of QUIC showed good performance for short flows with public accesses
- For long flows, the E2E losses can have a huge impact

# Solutions to loss events

- Adding coding in QUIC
  - I-D.swett-nwcrq-coding-for-quic
  - Interaction between congestion control and coding
    - draft-kuhn-coding-congestion-transport-00
    - Presented at NWCRG
- Workshop on QUIC for high BDP network
  - Details : <https://trac.ietf.org/trac/ietf/meeting/wiki/106sidemeetings>
  - Time : 3pm30 – 4pm30 on Wednesday
  - Where : Bras Basah