

5G BROADCAST FOR MOBILE VIDEO STREAMING

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POLITECNICO
MILANO 1863

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"Rai Way Experimentation of 5G Broadcast Network and Services in the 700 MHz Band in the Cities of Turin and Palermo"

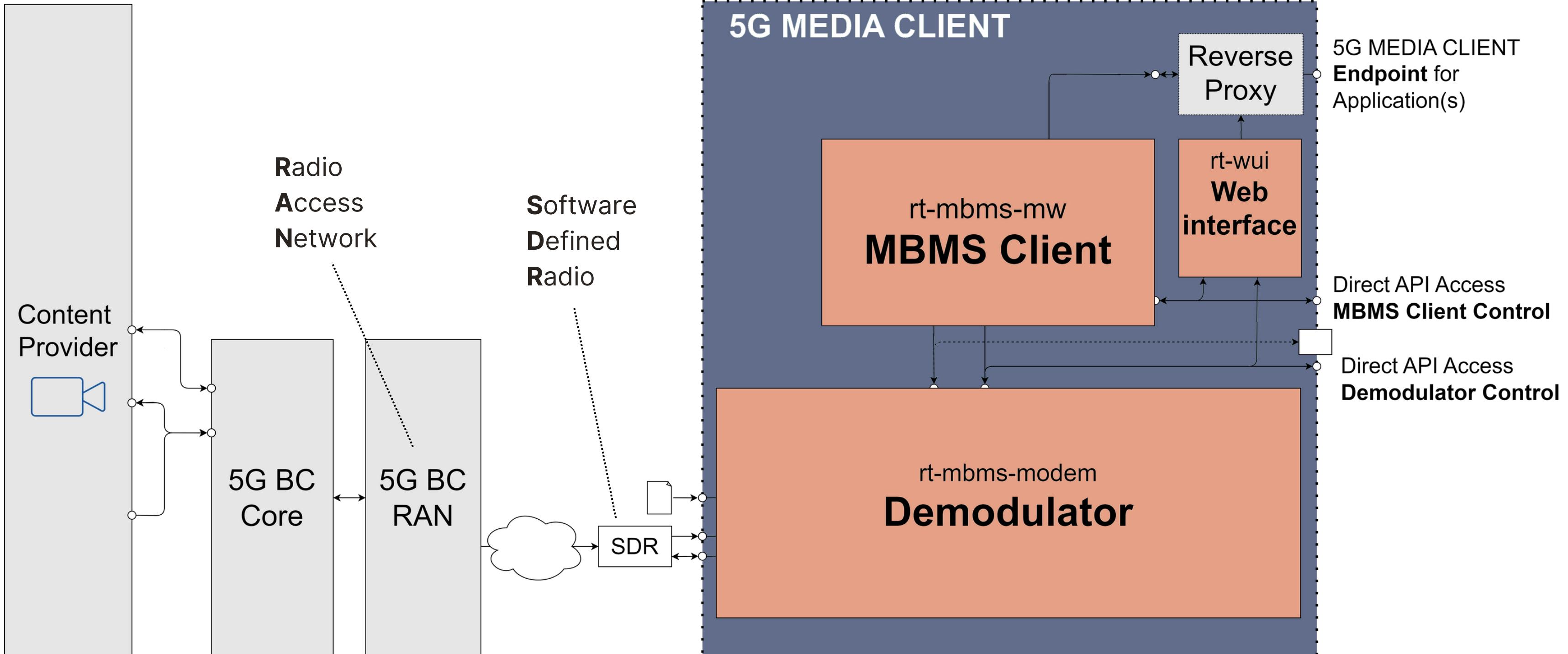
Rai Way, RAI, Politecnico di Milano,
Rohde&Schwarz, Kineton, Impersive

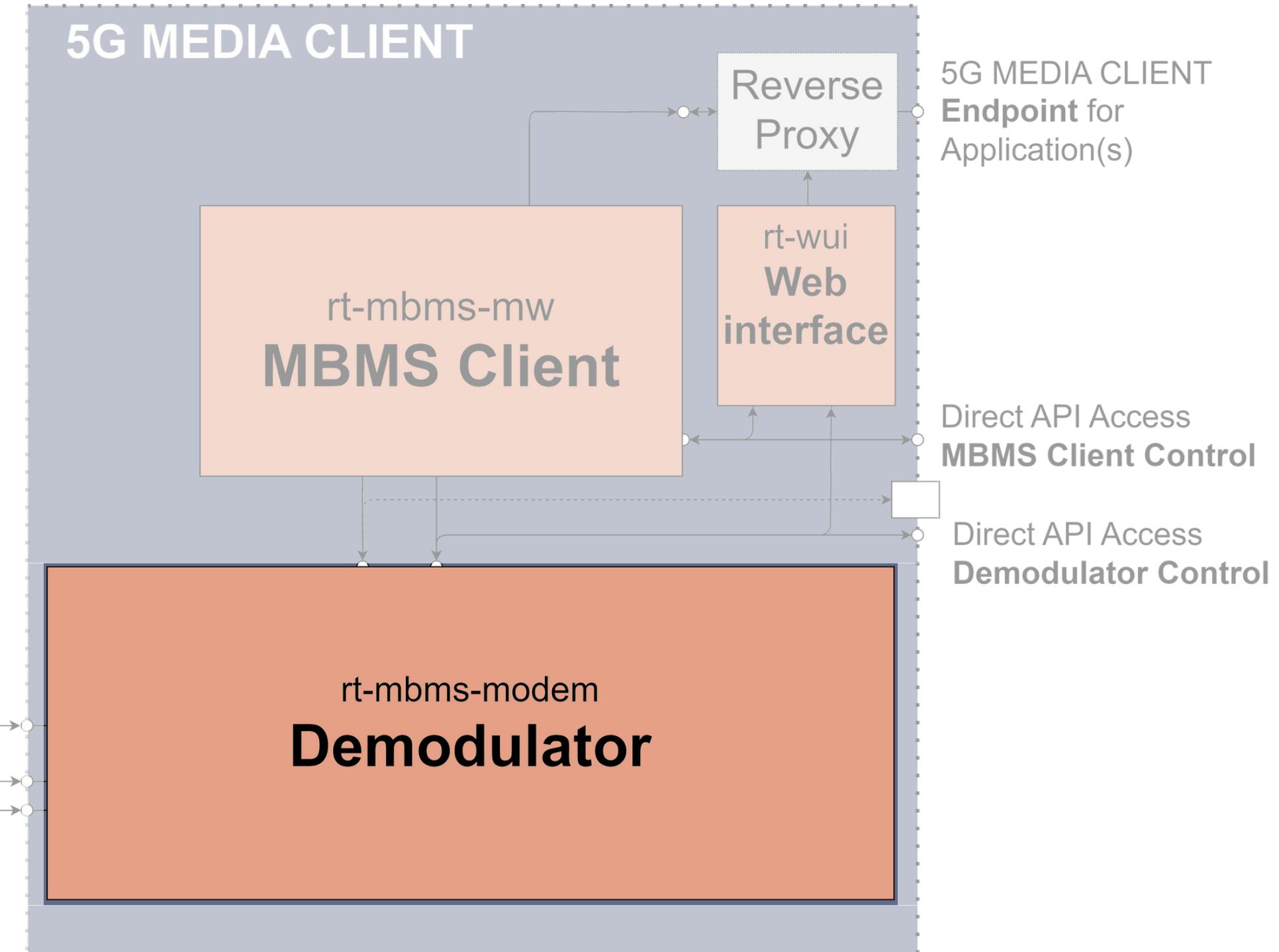
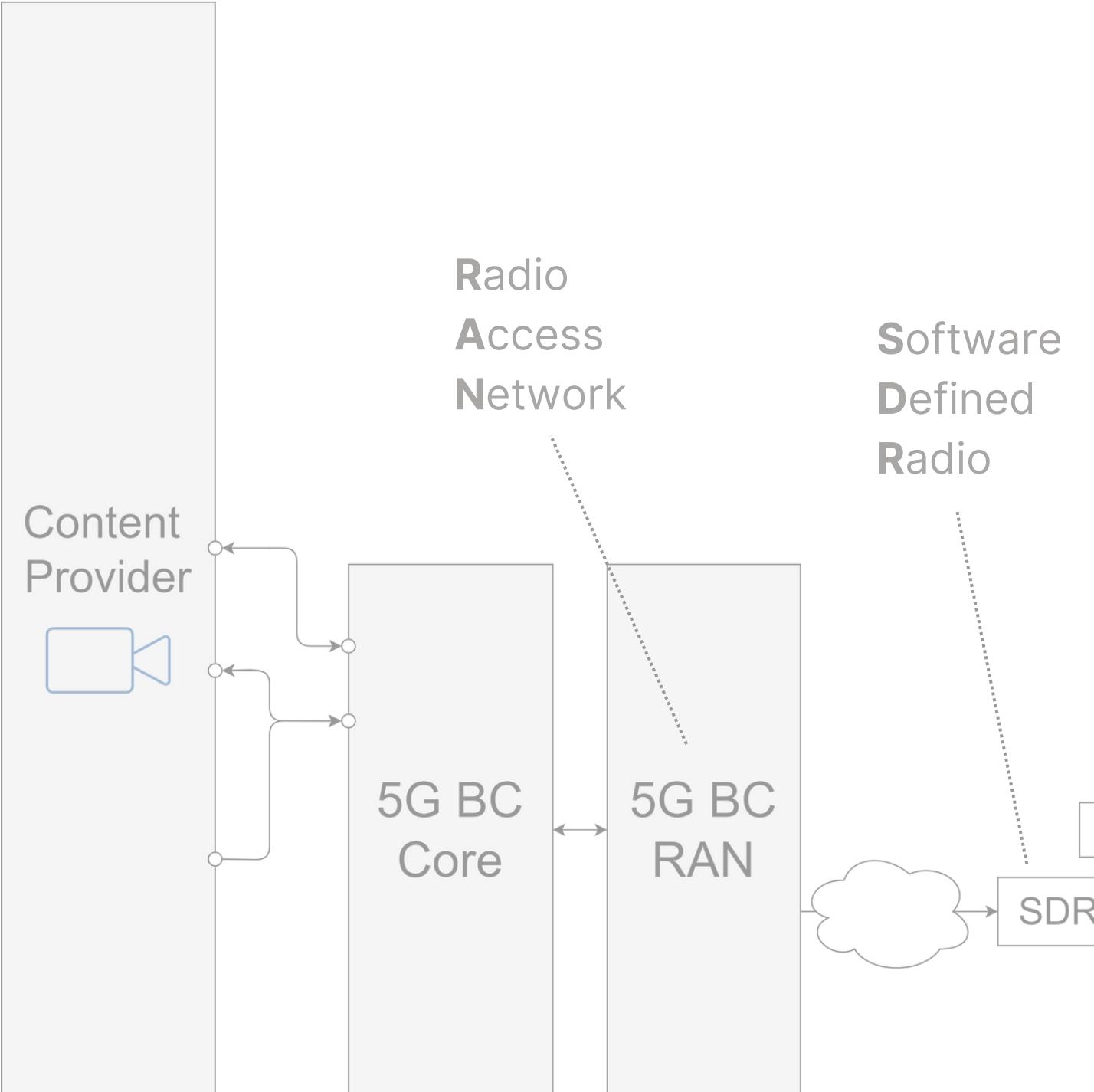
Starting Point

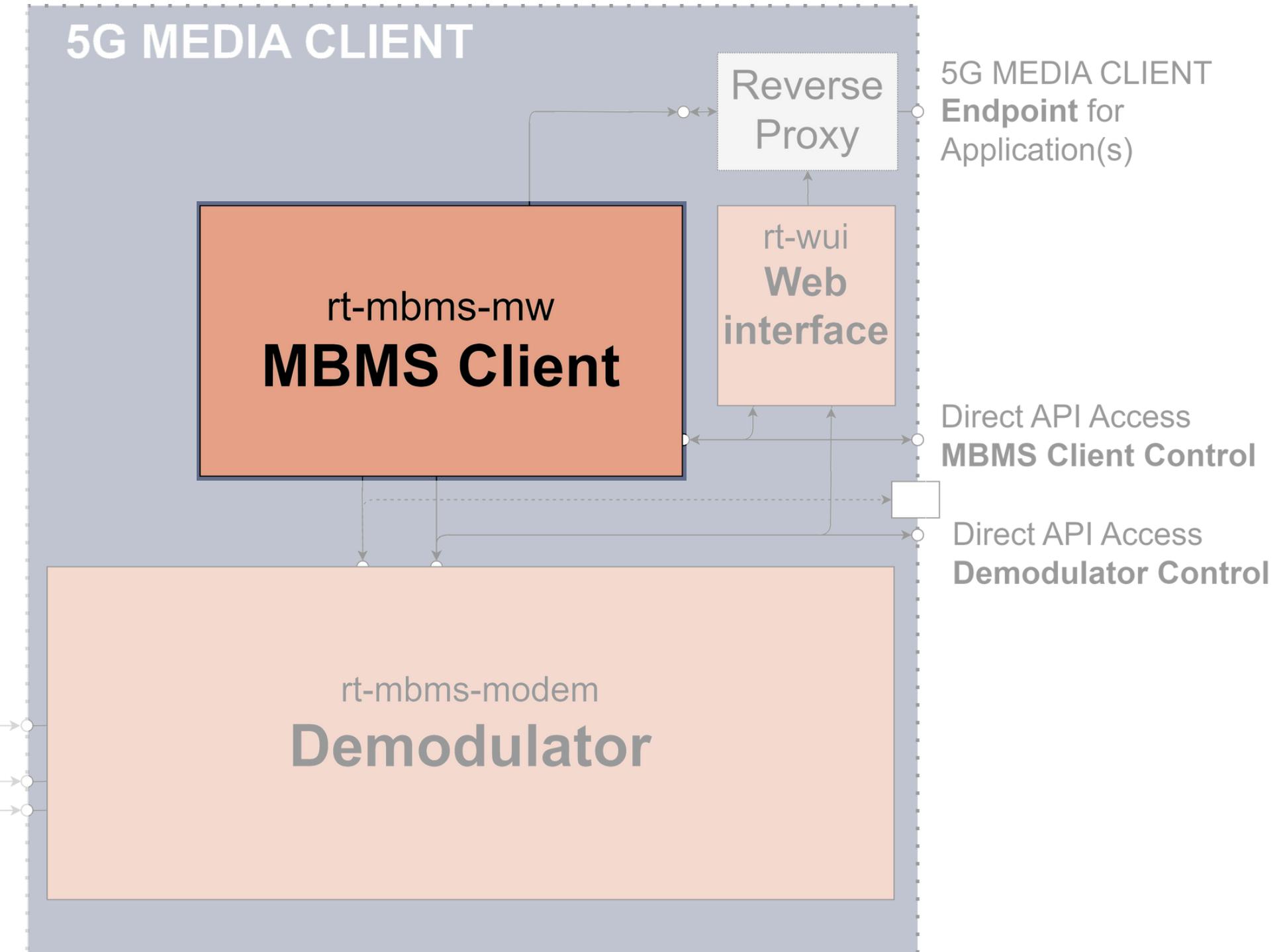
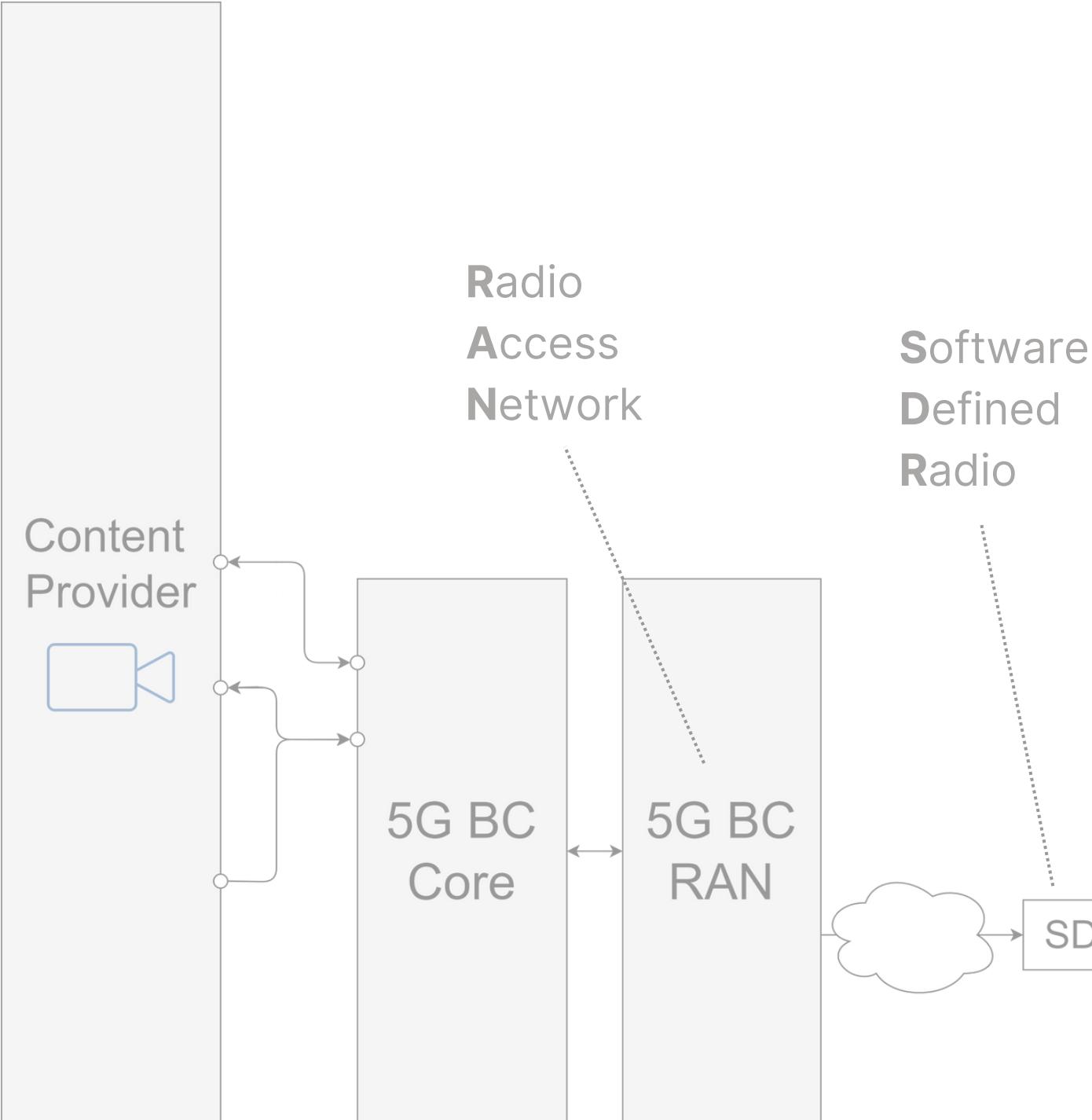
5G Media Action Group

Fostering media
connectivity ecosystems

- Based in Geneva, Switzerland
- 5G-MAG Reference Tools (RT)







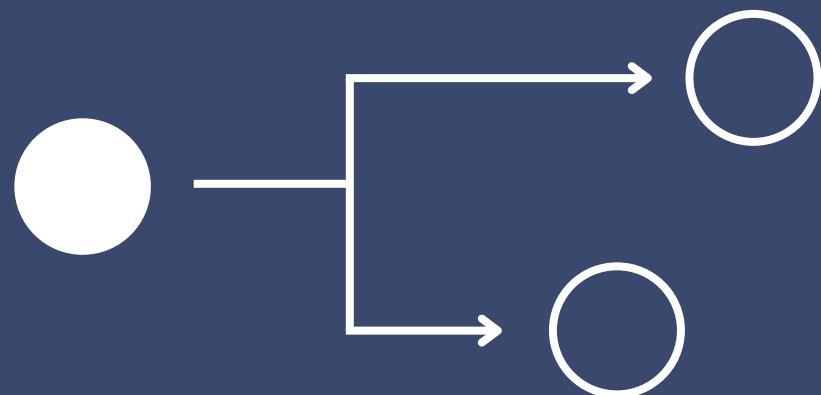
Seamless Switching Application

BroadBand



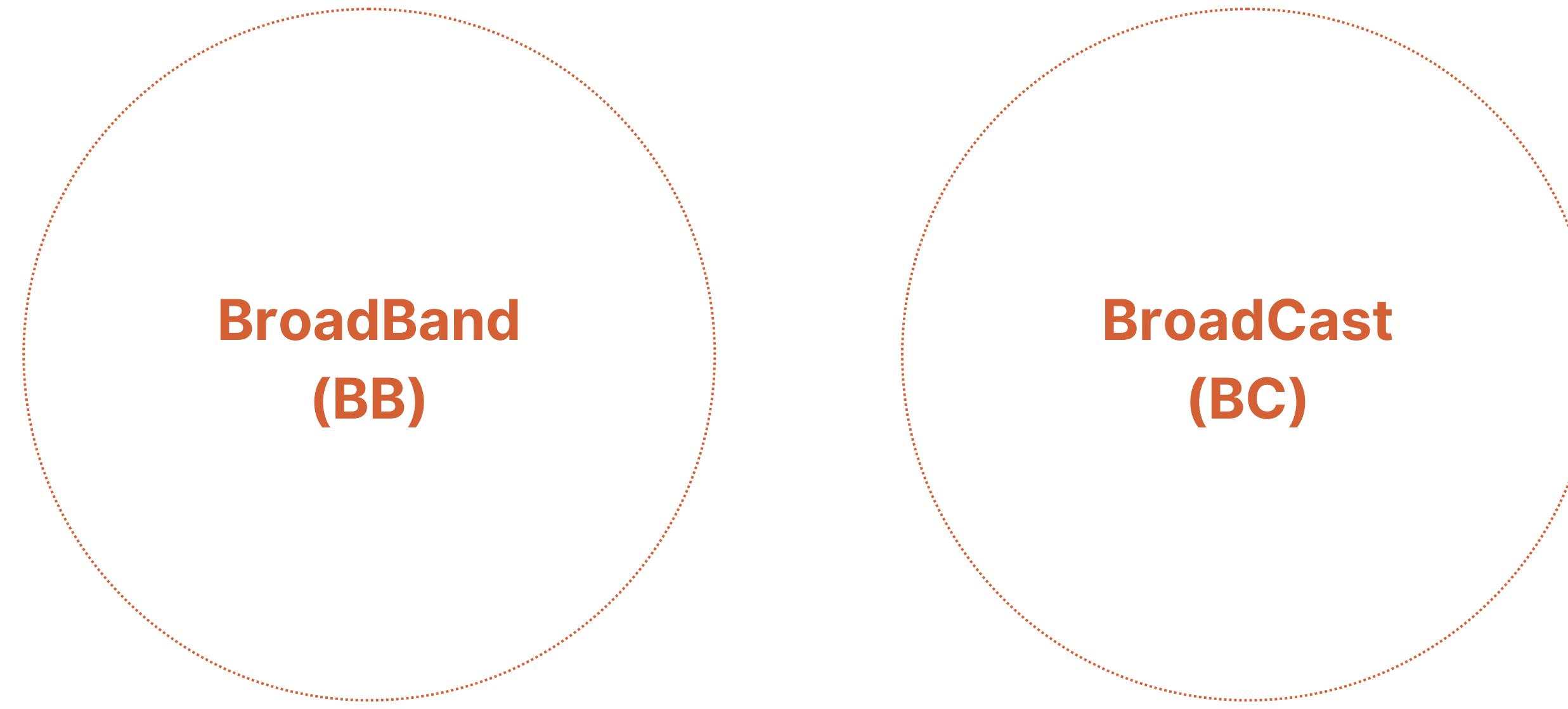
- One-to-one transmission
- Exchanging personalized information
- Performance influenced by network traffic

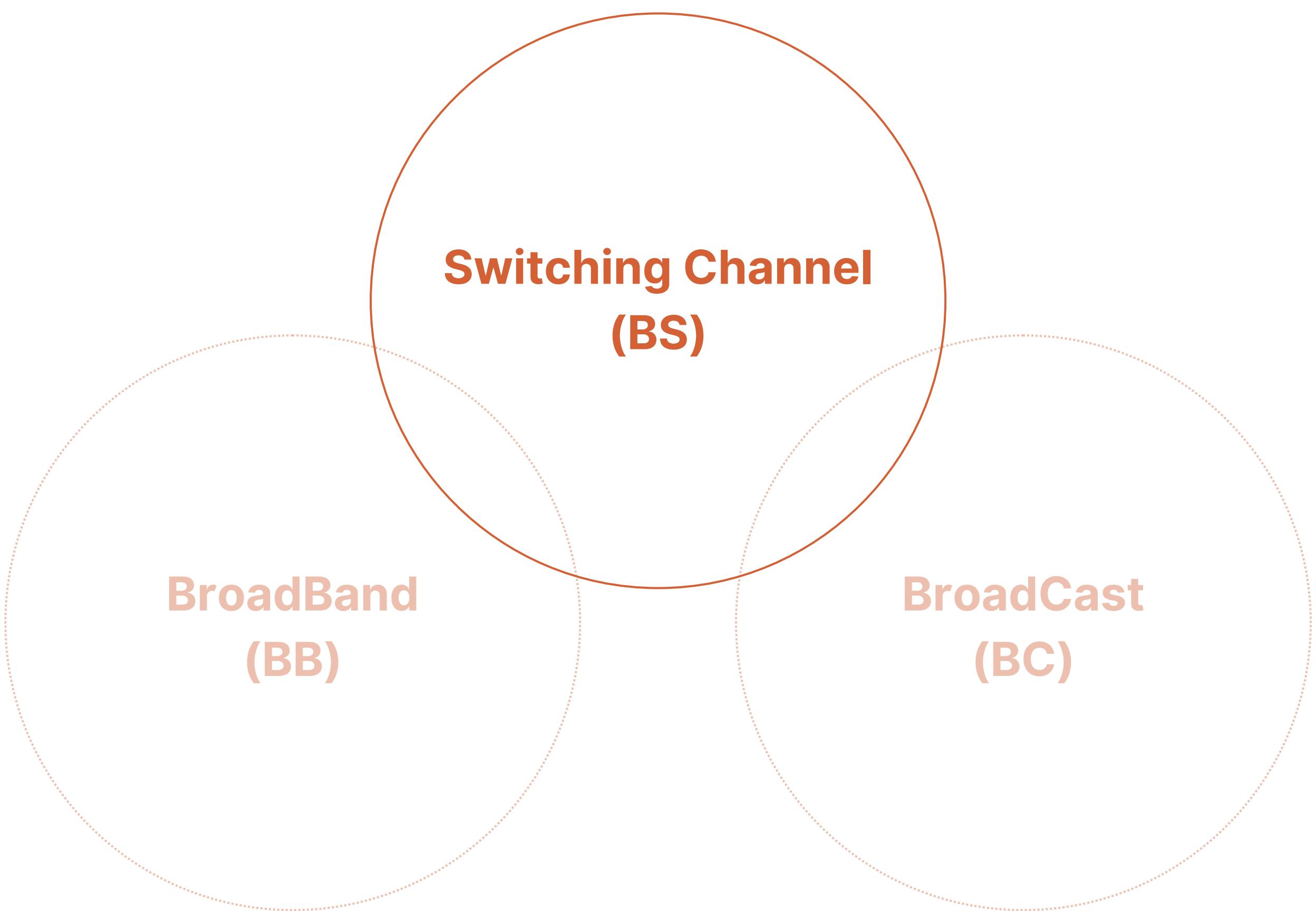
BroadCast



- One-to-many transmission
- Same information to all nodes
- Single communication channel shared by all nodes

Video streaming channels



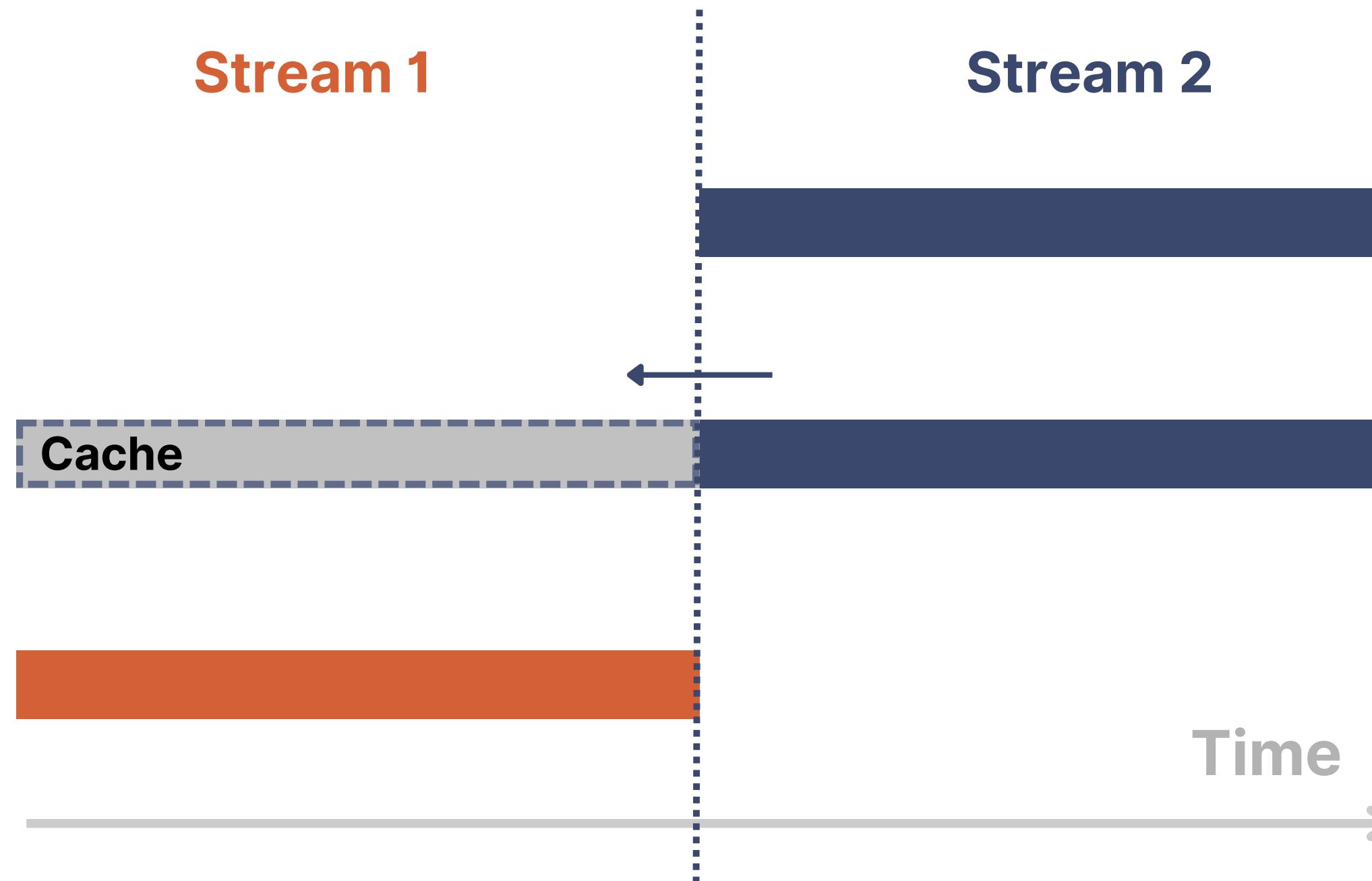


**Switching Channel
(BS)**

**BroadBand
(BB)**

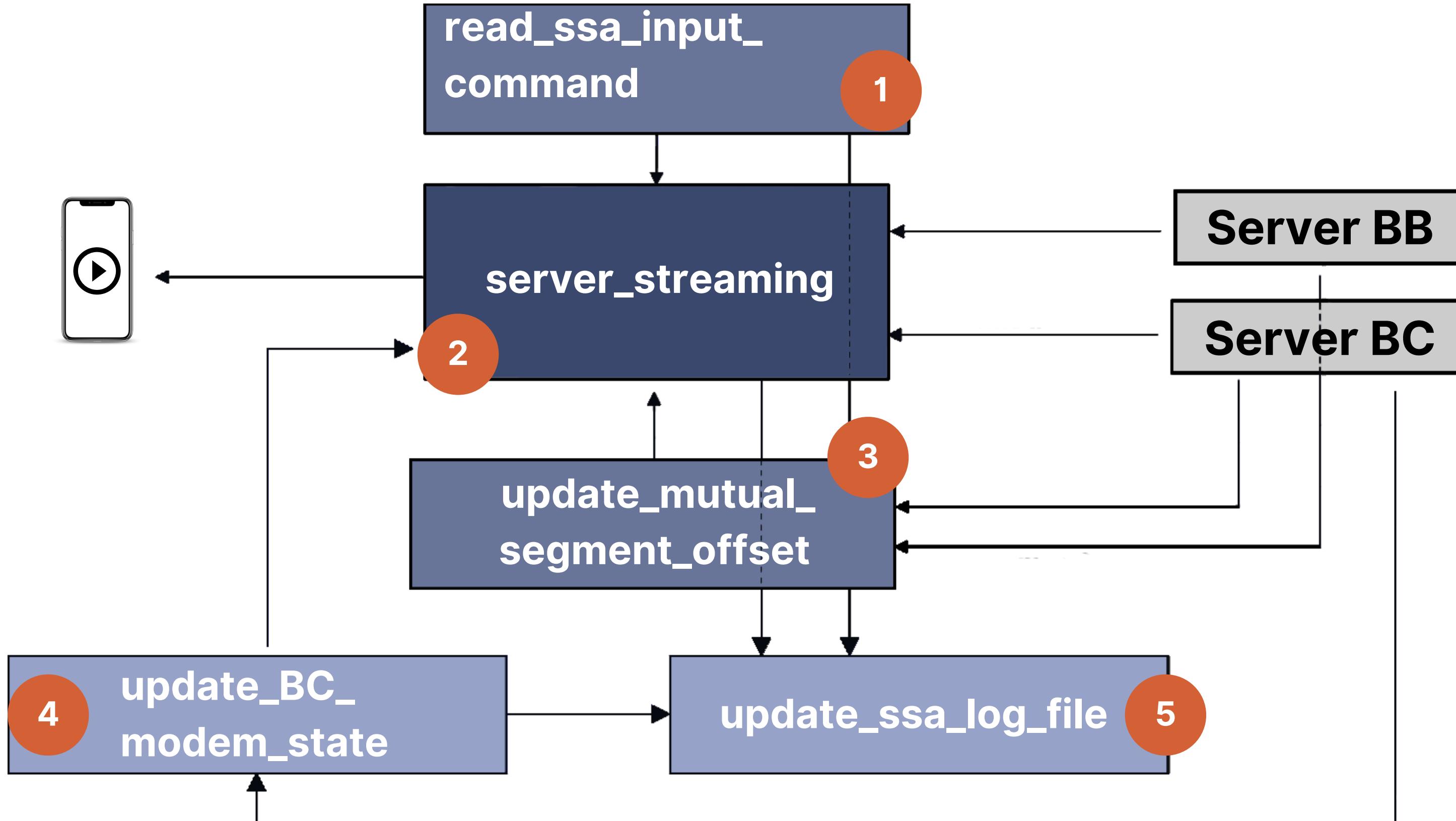
**BroadCast
(BC)**

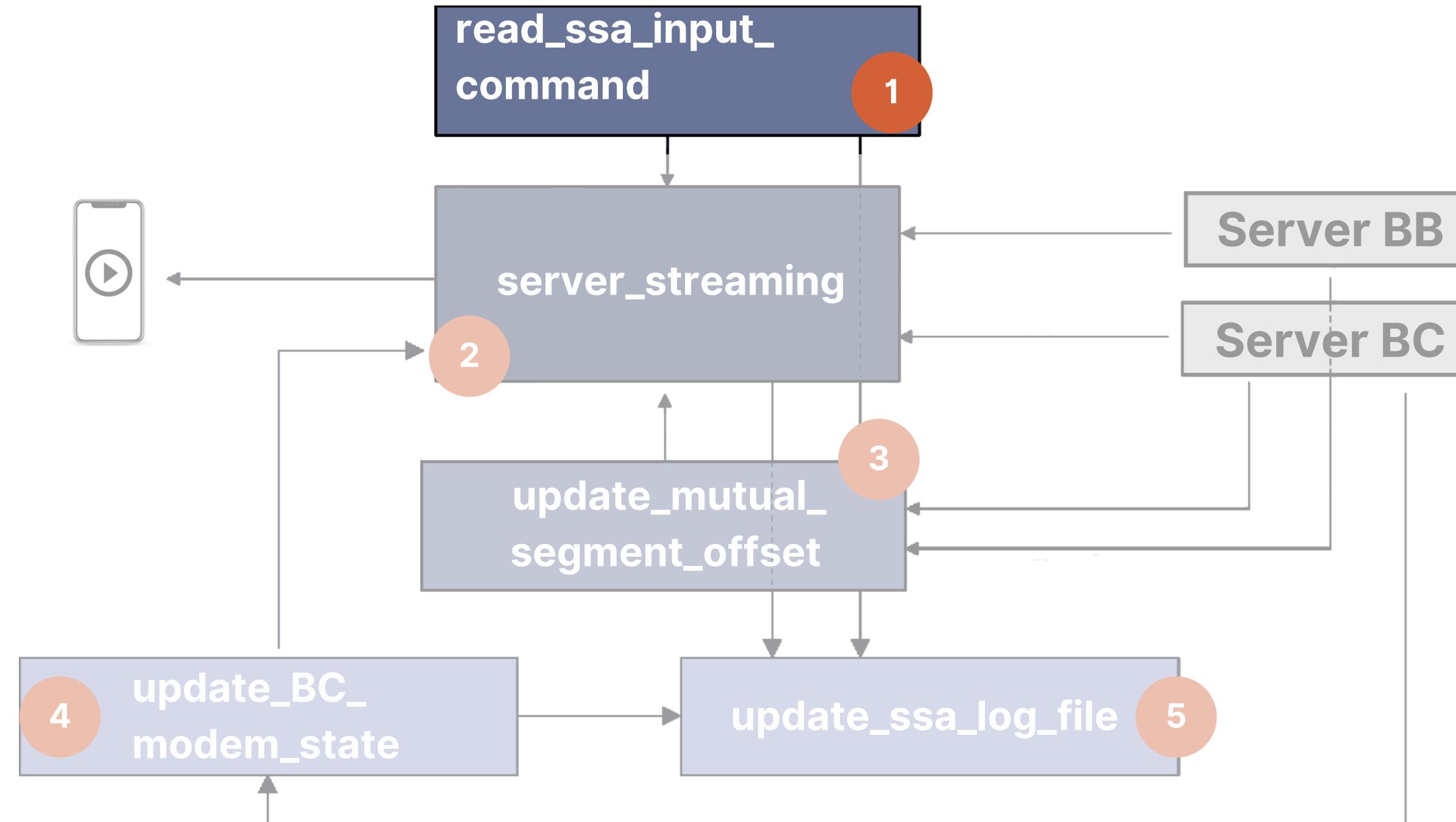
Channel synchronisation



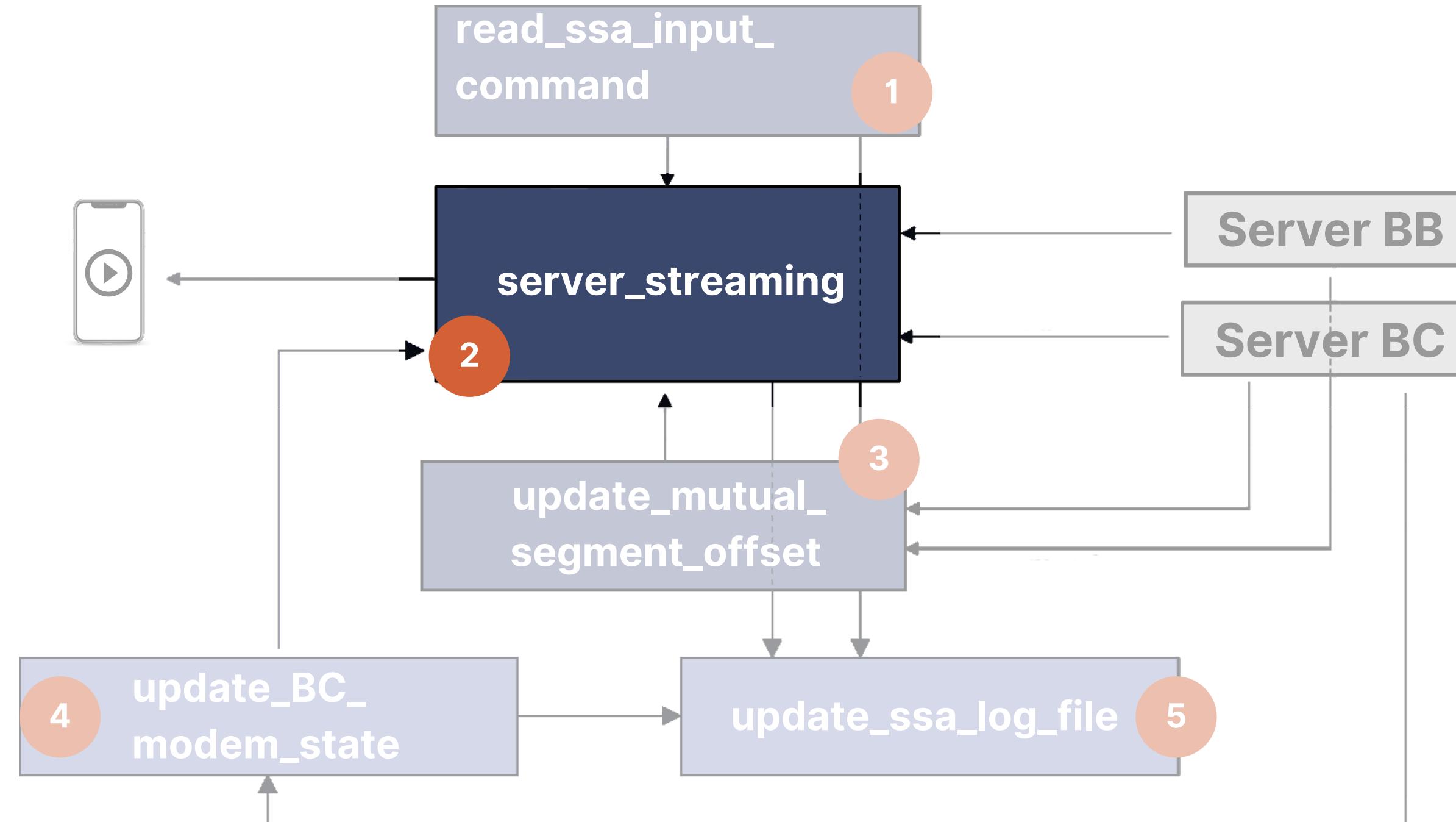
SSA Processes

- 1 **read_ssa_input_command**
- 2 **server_streaming**
- 3 **update_mutual_segment_offset**
- 4 **update_BC_modem_state**
- 5 **update_ssa_log_file**

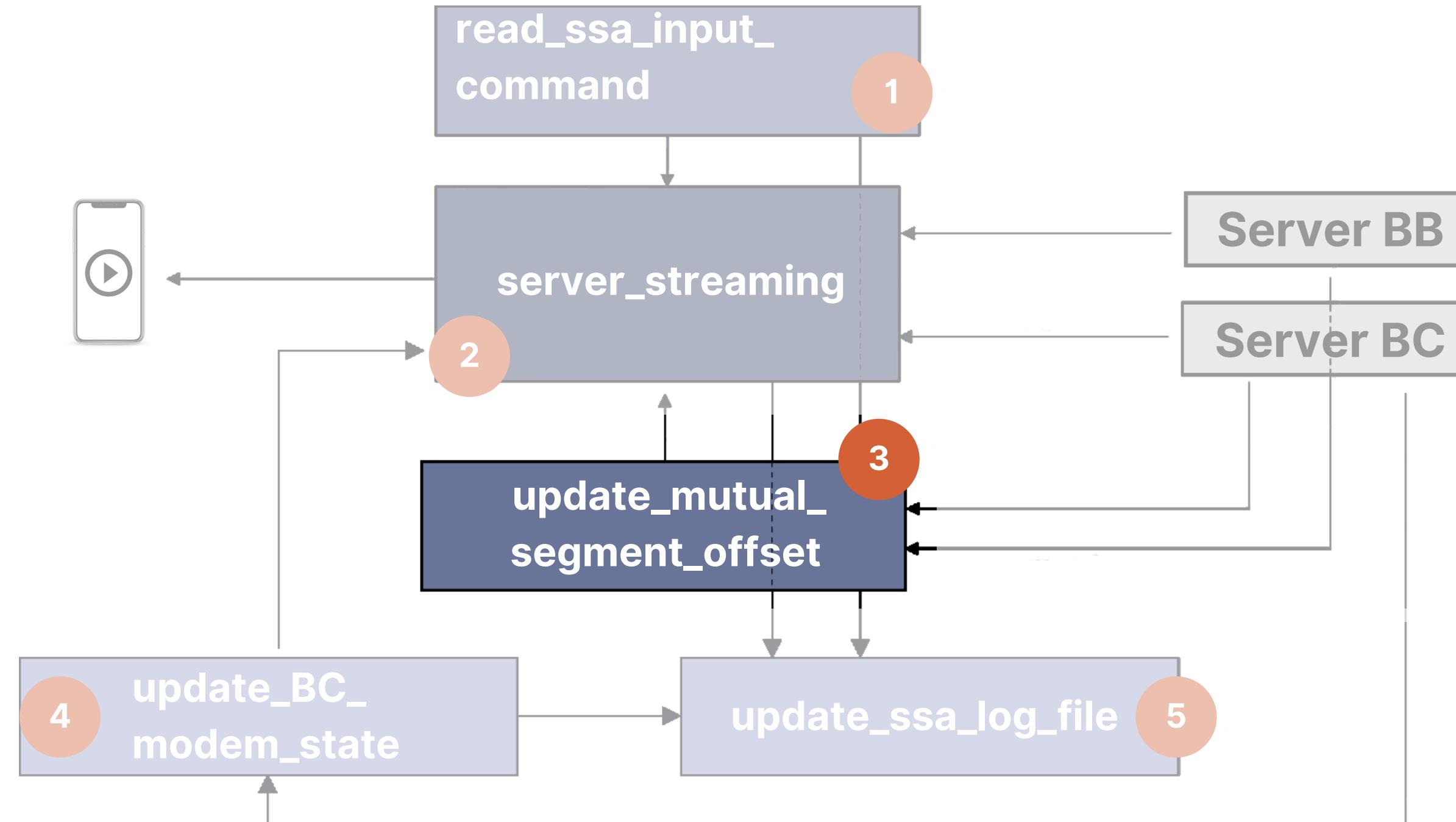




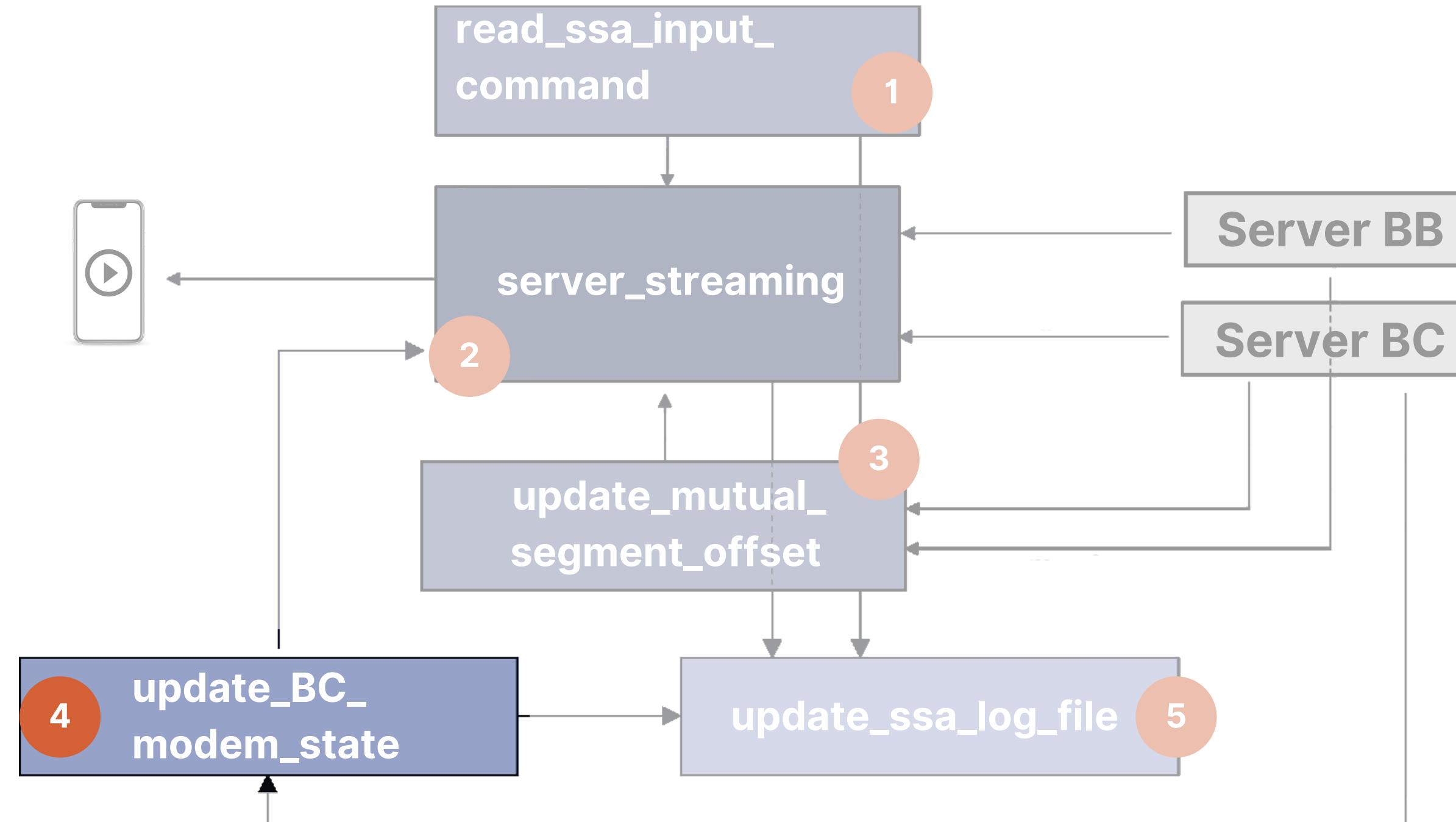
Interprets commands
received from the terminal



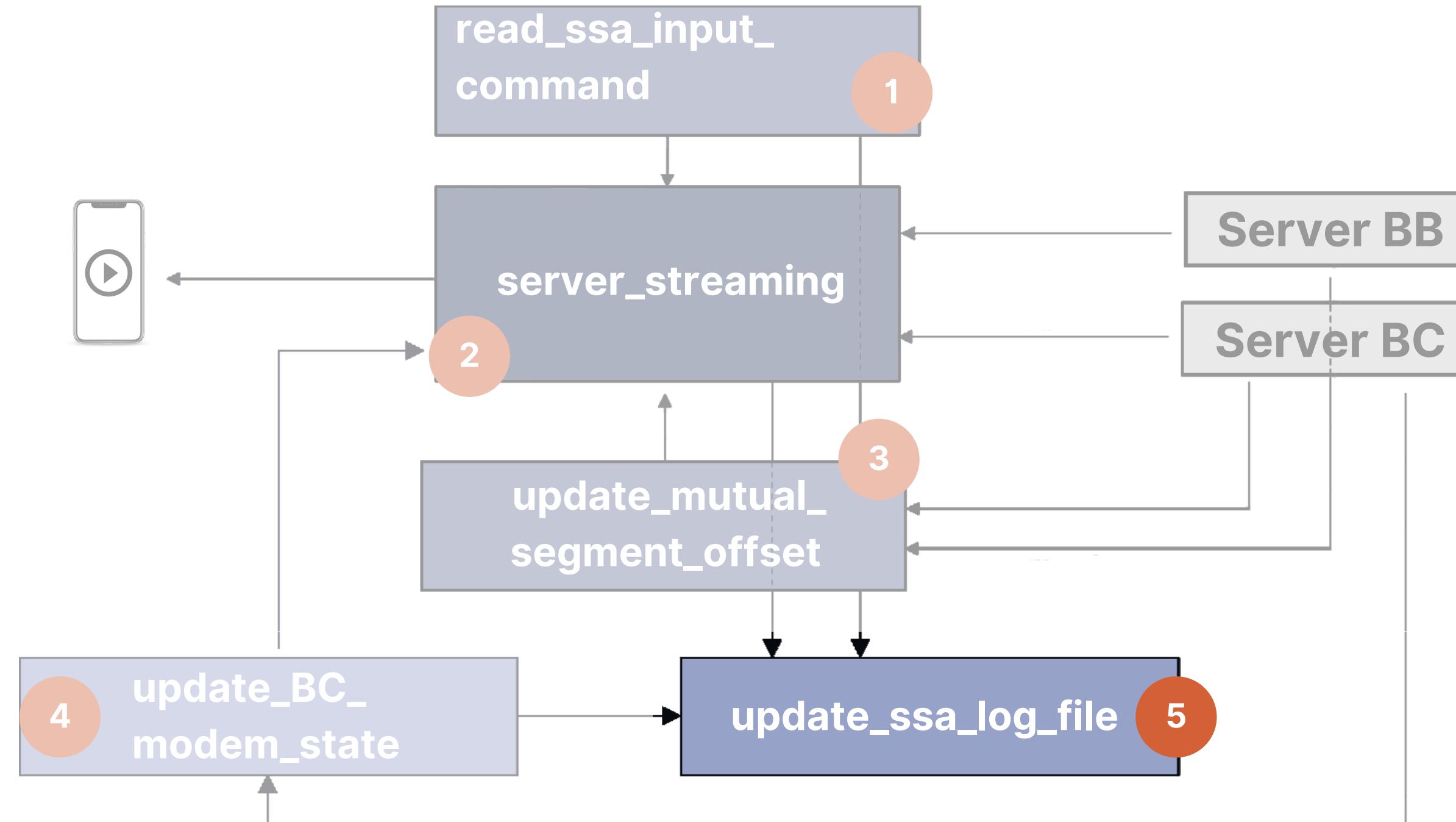
Responsible for managing video streaming
requests across the three channels



Determines the relative delay
between the two streams



Retrieves Signal-to-Noise Ratio (SNR)
measurements of the BC channel

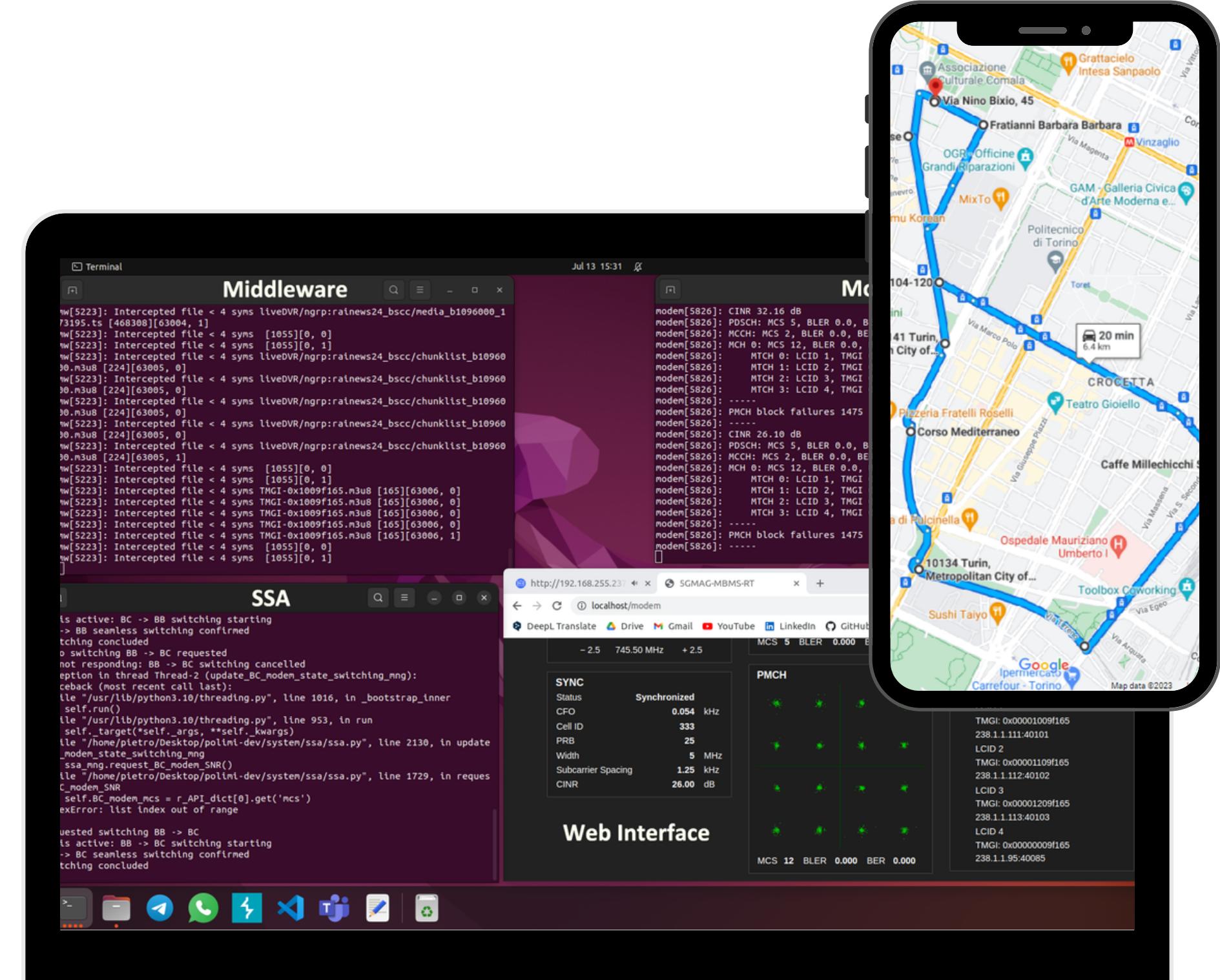


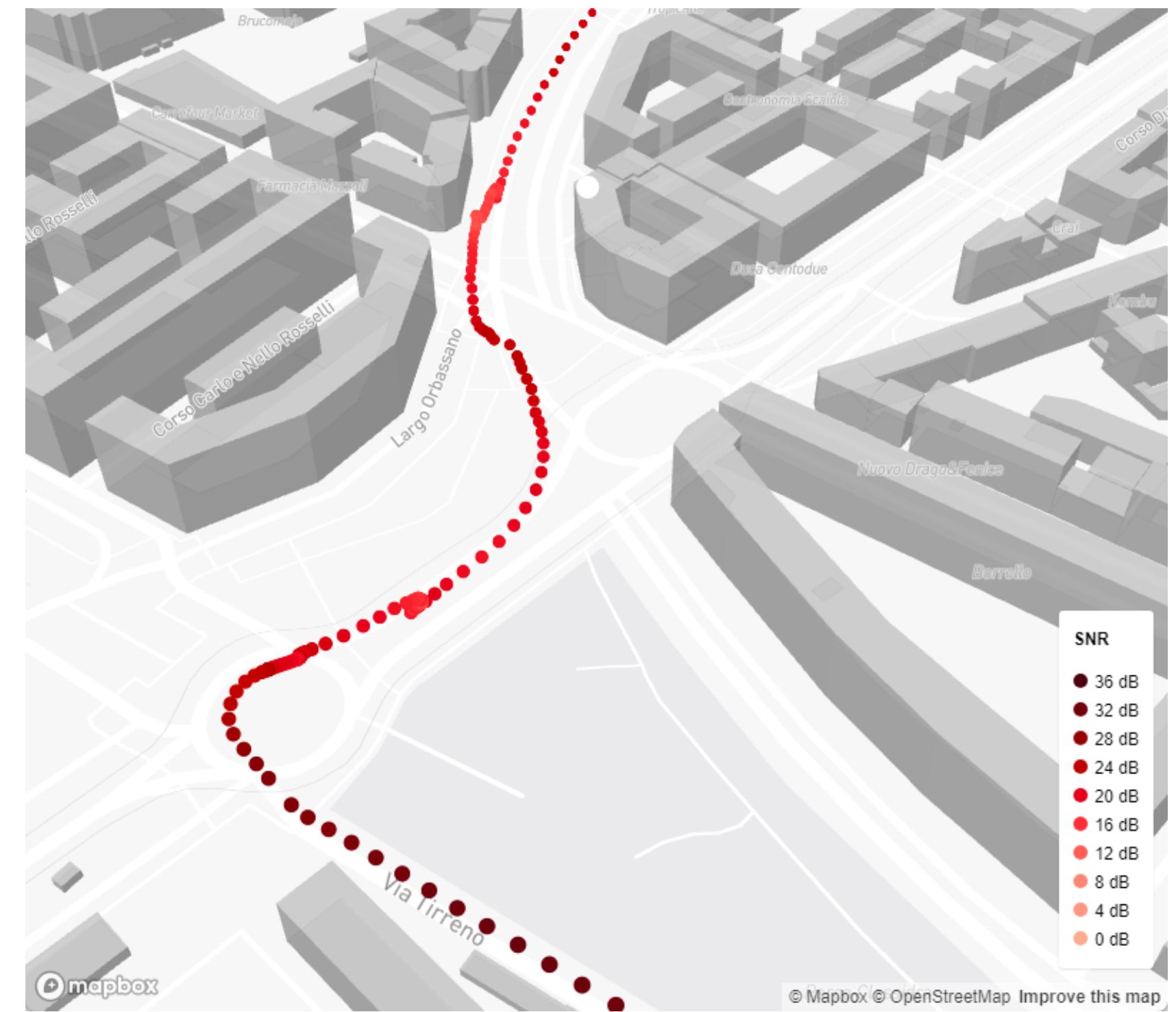
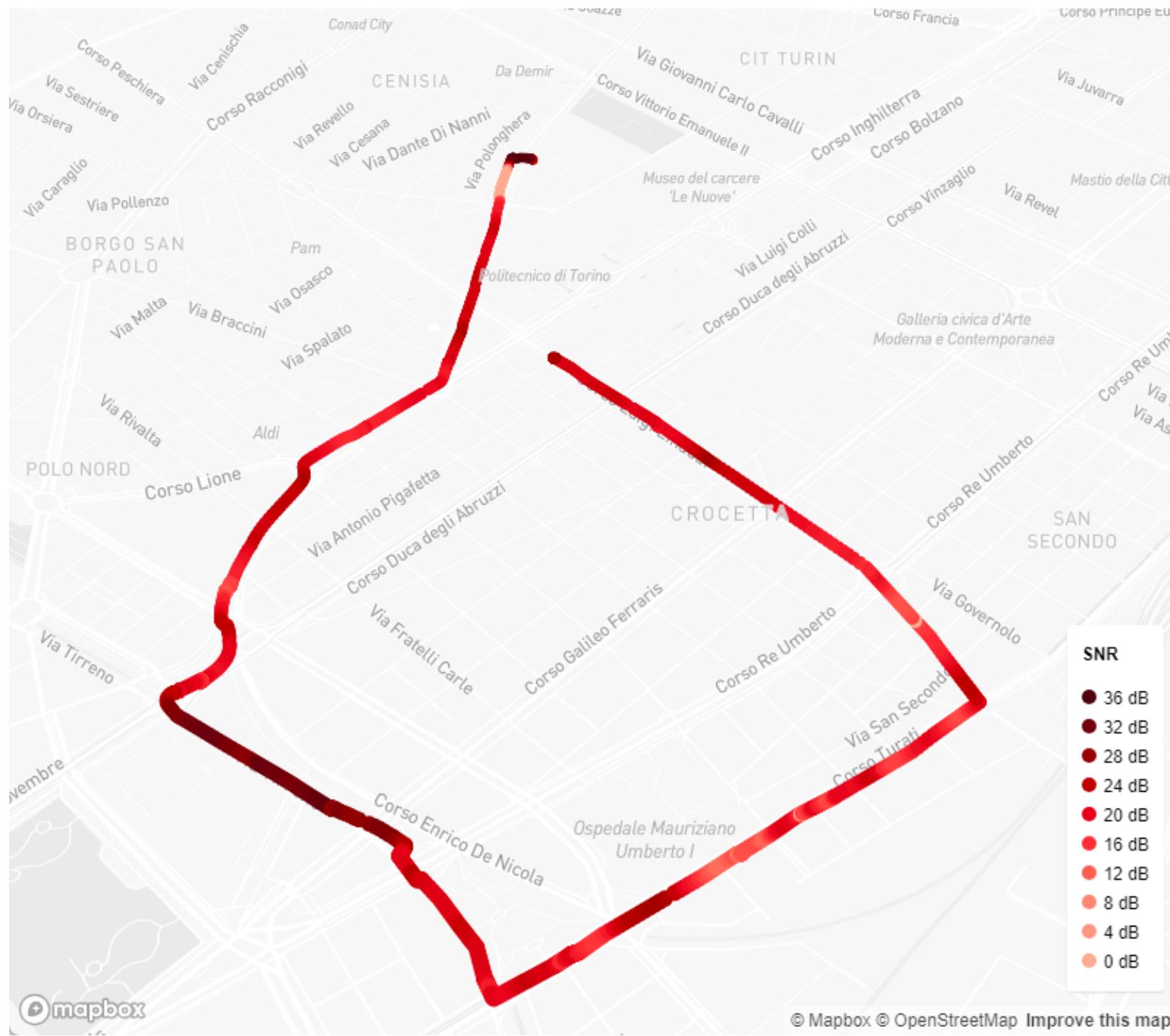
Managing and
updating log files

On the field measurements

Context and setup

The experimentation took place in Turin on July 13 2023, using the 5G transmitter of Torino Eremo, driving a loop route in the car with an external antenna.



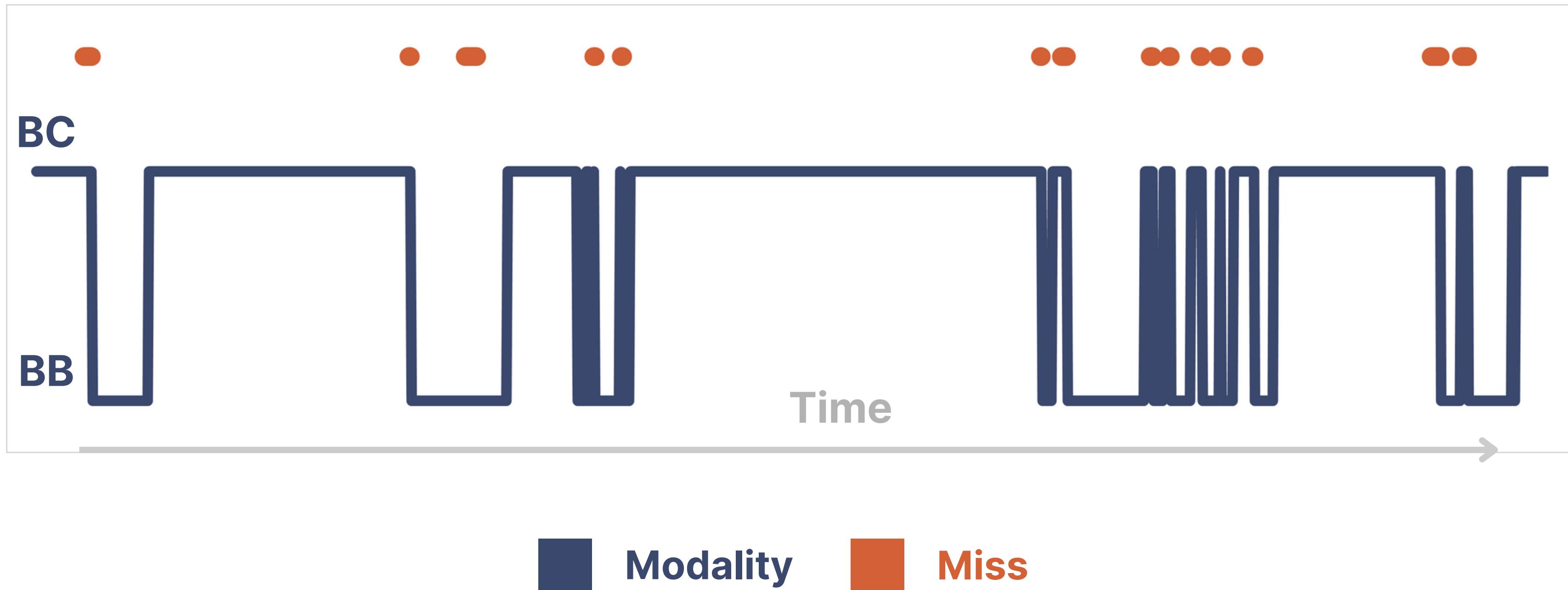


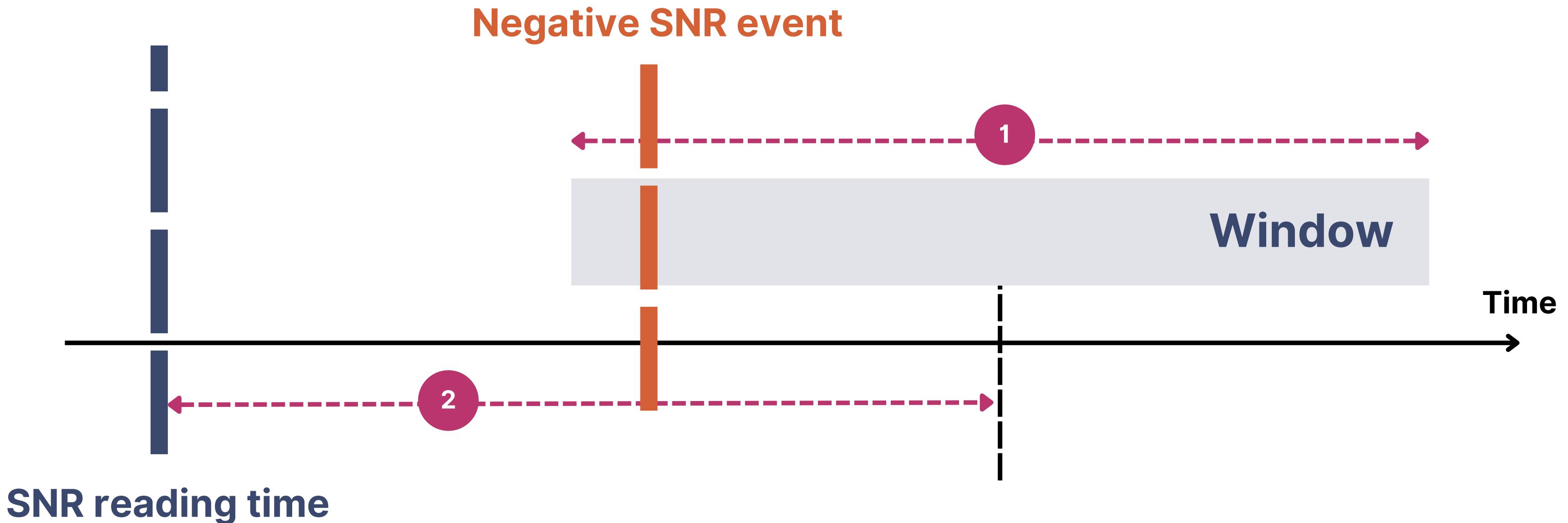


Player miss analysis and solution

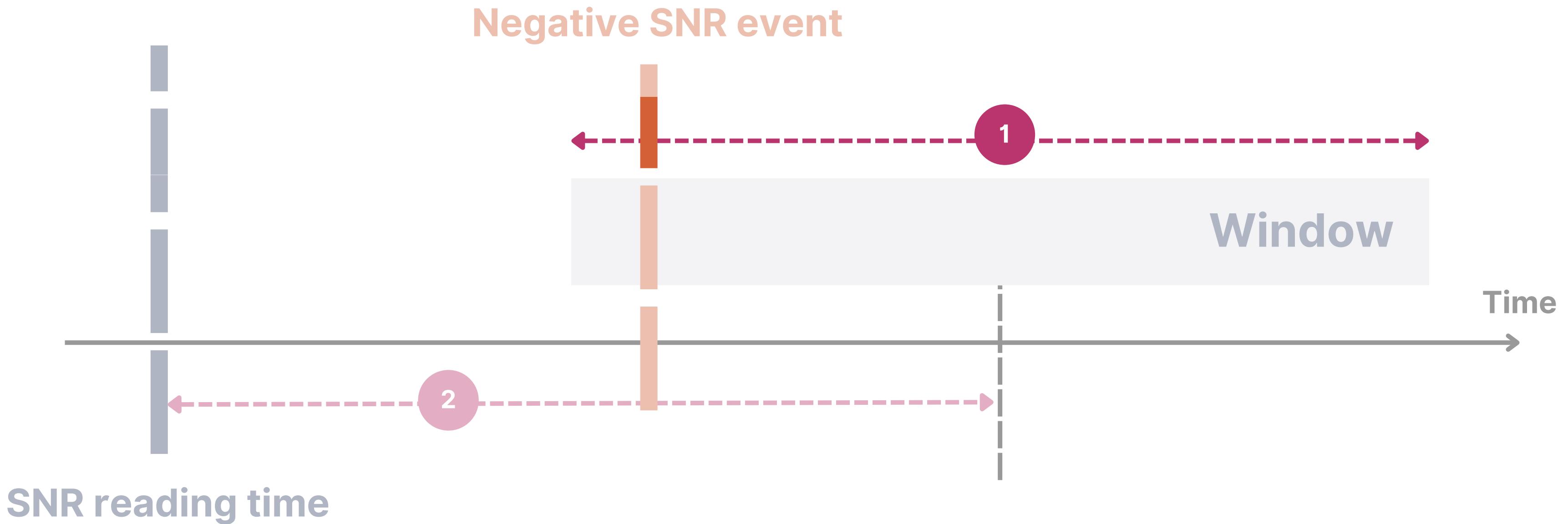
'miss' moments occur when specific **chunk** is **skipped** or when a **gap** of more than **3 seconds** occurs between consecutive chunks.

On the field results

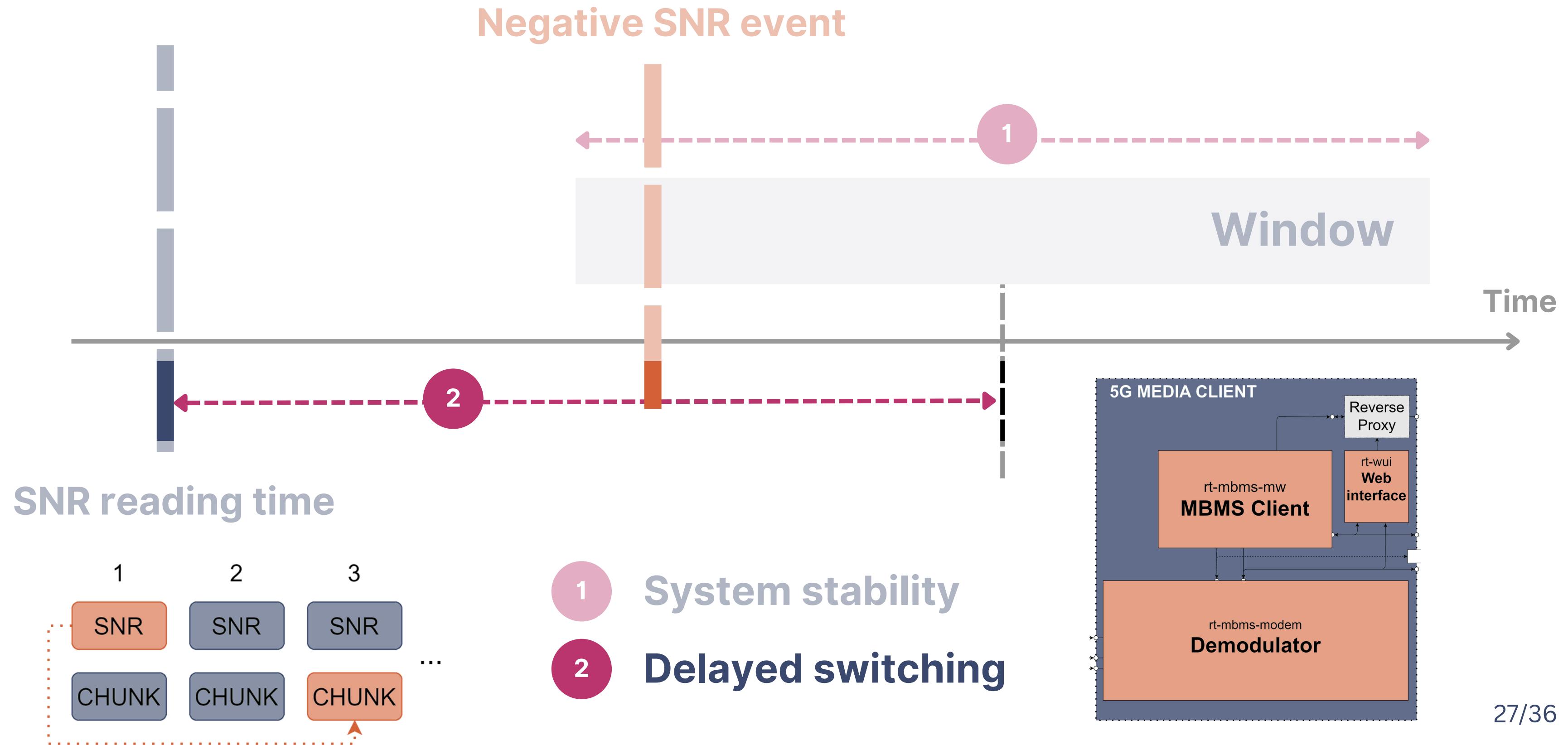




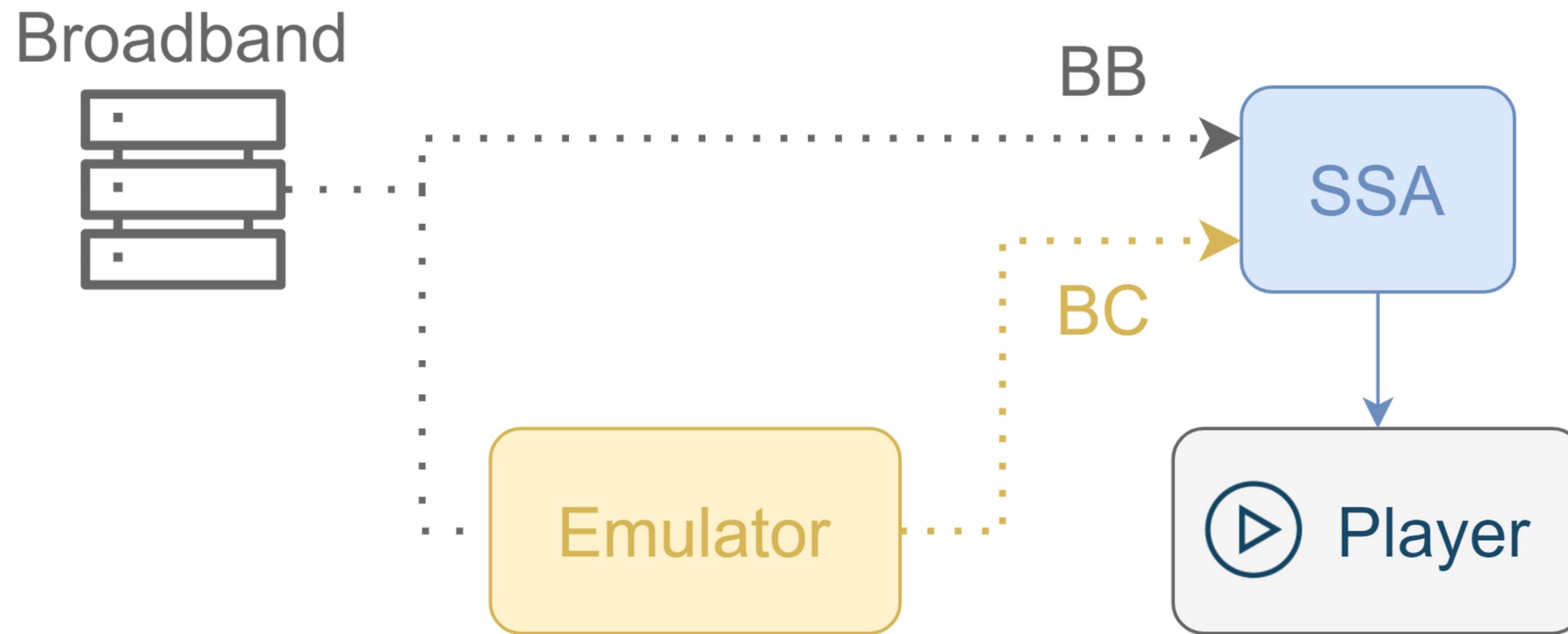
- 1 System stability
- 2 Delayed switching



- 1 **System stability**
- 2 **Delayed switching**



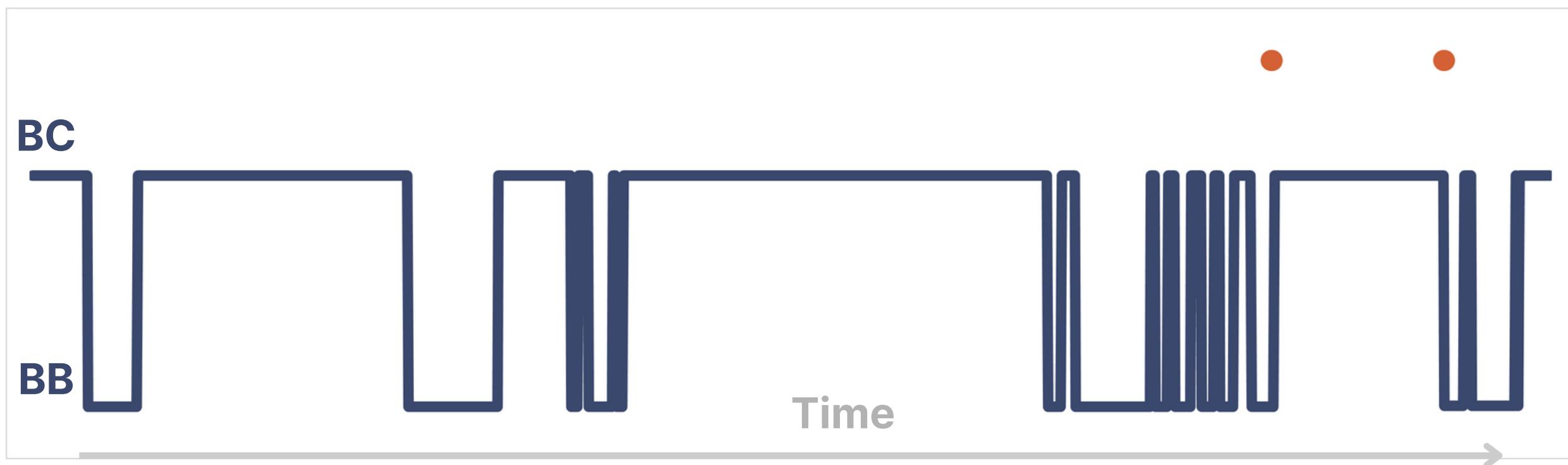
Emulator



Field data window 10s



Emulator data window 6s



Conclusions

1

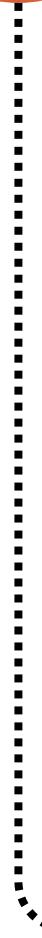
5G-MAG

Reference

Tools system analysis



5G-MAG
Reference
Tools system
analysis



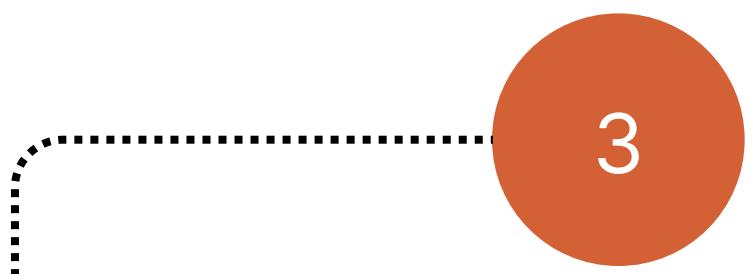
SSA
development



**5G-MAG
Reference
Tools system
analysis**



**SSA
development**

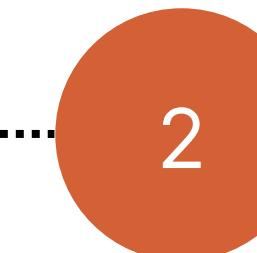


**Experimental
activity**

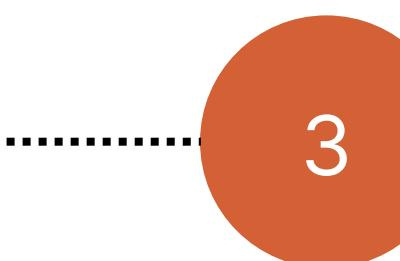




**5G-MAG
Reference
Tools system
analysis**



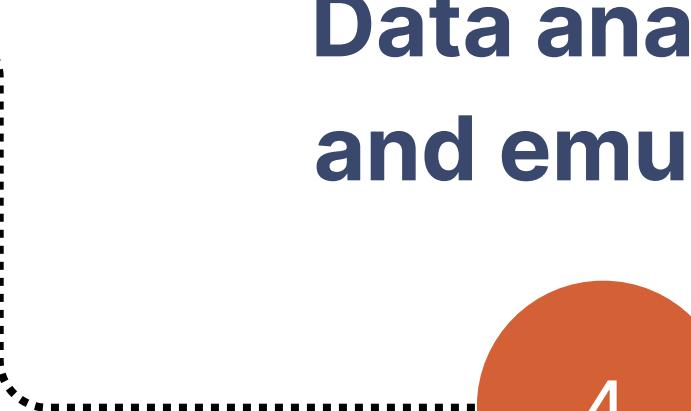
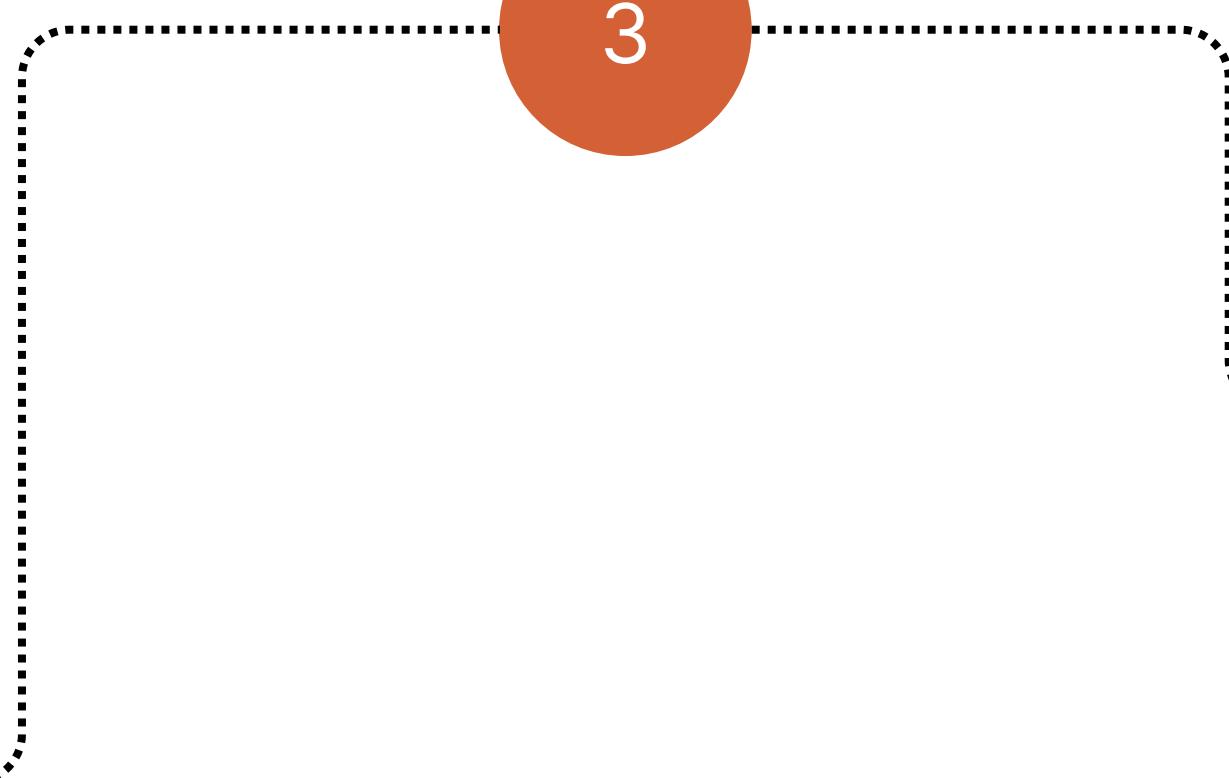
**SSA
development**



**Experimental
activity**



**Data analysis
and emulator**





**5G-MAG
Reference
Tools system
analysis**



**SSA
development**

**Experimental
activity**



**Improved
parameterization
for video fluidity**



**Data analysis
and emulator**



***"Efficient delivery of audiovisual
content to mobile devices combining
5G Broadcast and CDN technologies"***

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**Thank you for your
attention!**