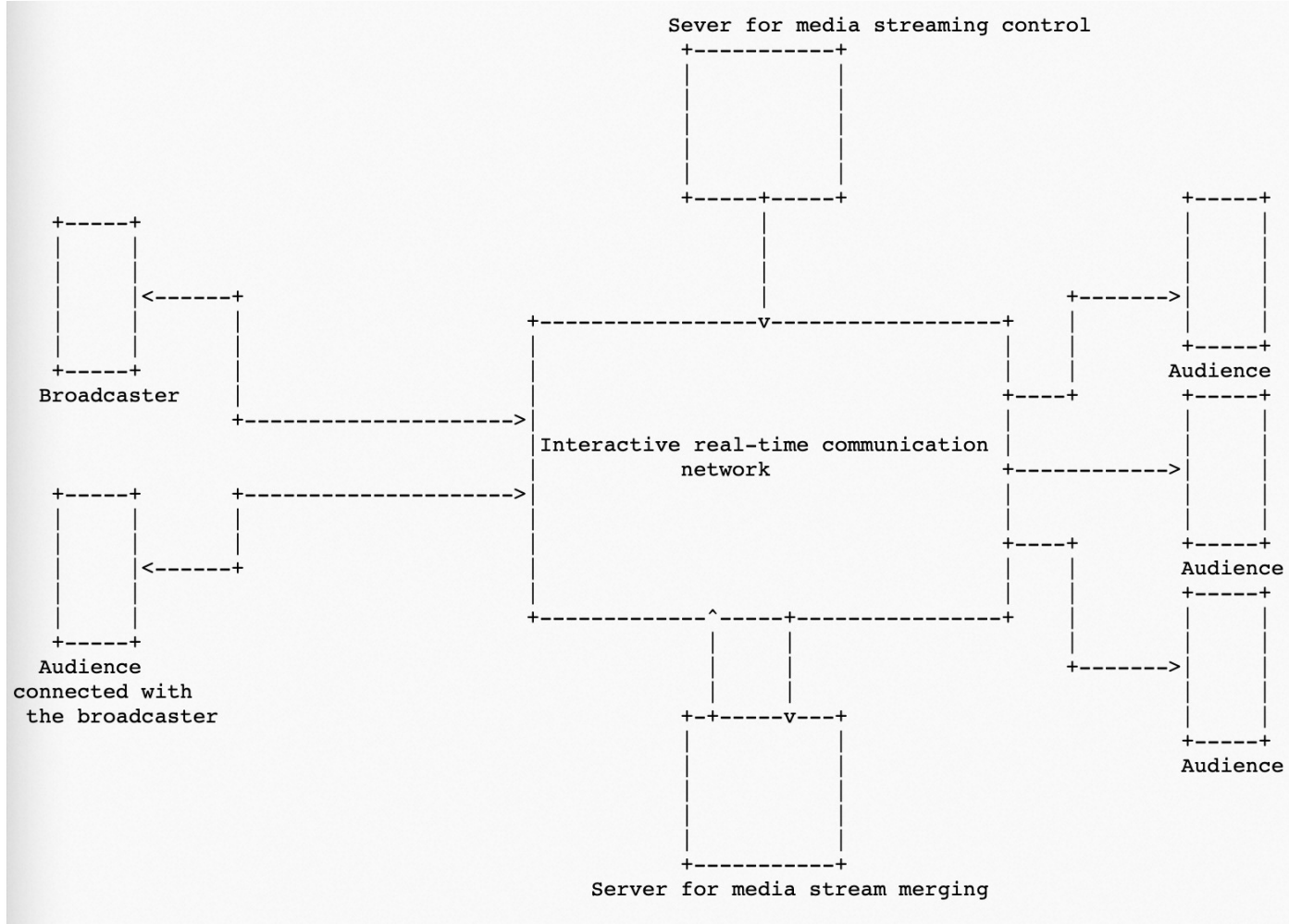


Protocol for interactive low-latency media transmission system

Architecture

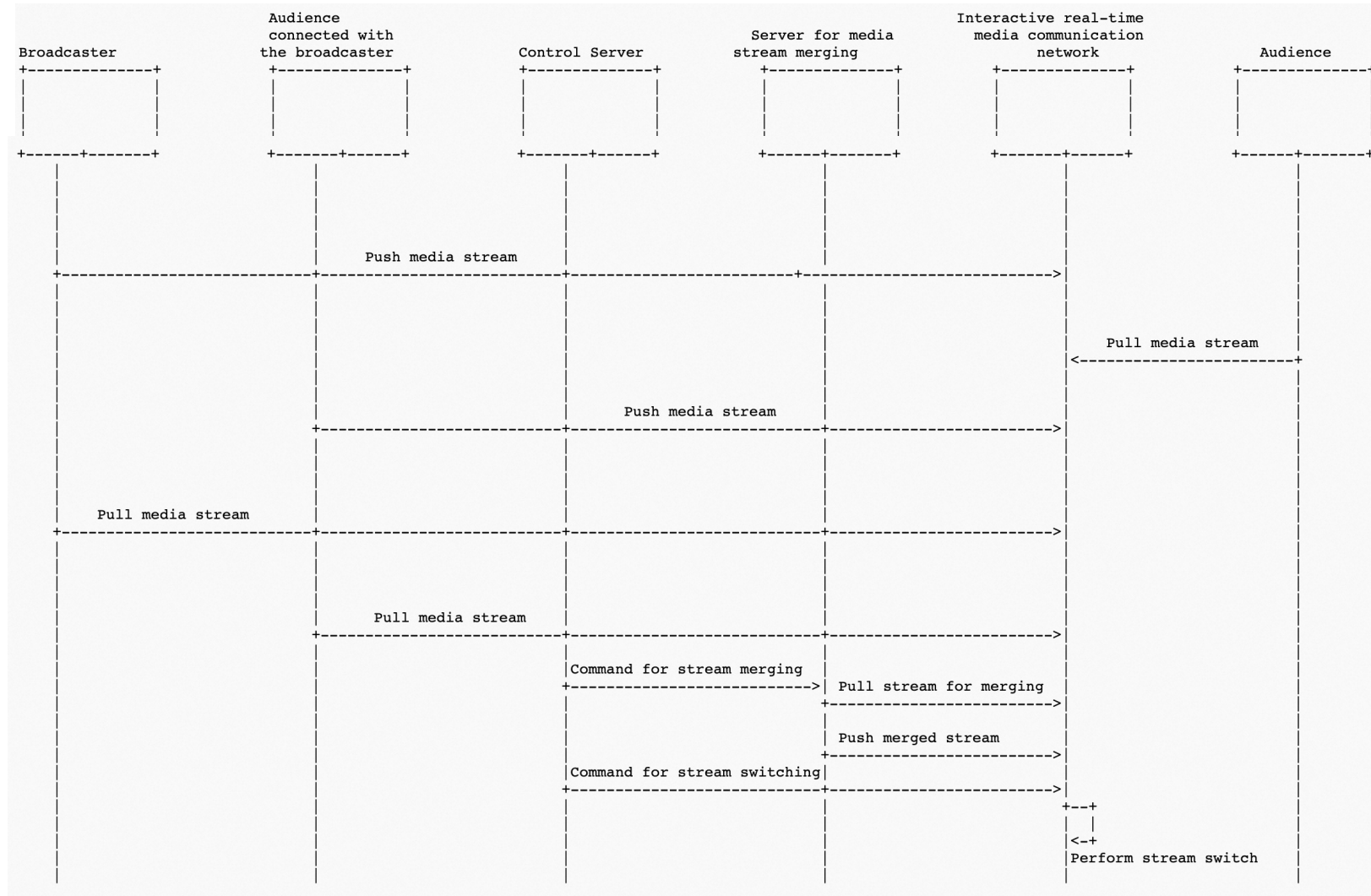


Gap Analysis

- Interactive Online broadcasting service is flexible and much more complicated compared with traditional media broadcasting service.
- Audiences may occasionally request to setup bidirectional real-time communication with the broadcaster and all the other audiences should be able to receive the merged interactive media traffic containing the broadcaster and connected audience.
- To meet this end, there is a need for standardized signaling protocol which can support media stream merging, switching and pulling to support those complicated scenarios.
- Applications such as interactive online broadcasting, short video, on-line education, on-line gaming are very delay sensitive.
- There are many different media transmission protocols (e.g. QUIC, WebRTC, etc) across different layers, which are widely used in the ecosystem, the protocols for media stream merging, switching and pulling should be able to compatible with different transmission protocols.

- The communication network can provide fundamental capabilities of media stream, including media pulling, media pushing.
- In addition, the network can also support capabilities such as media merging and media switching. The capabilities can be triggered by control server and server for media streaming merging, which are provided by 3rd party.

Signaling Procedure



Signaling Specification

4. Signaling Specification

This section defines the signaling specification for the interactive real time media communication. In order to achieve the merging and switching functionalities for different media source, signaling messages need to be delivered to the corresponding entities (e.g. control server, edge node, etc) in order to perform the proper operations. The signaling message of interactive media control protocol is shown as follows:

```
Interactive Media Control Message {  
    Message Type (i),  
    Message Length (i),  
    Message Payload (..),  
}
```

Figure 3: Interactive media signaling message

ID	Messages
0x0	Merging
0x1	Switching
0x2	Grabbing
0x3	Pulling
0x4	Pushing

Table 1: Message types of Interactive media control protocol

4.1. Merging signaling message

Merging signaling message is used to request the server for media stream merging to perform media merging between a broadcaster and an audience. The merging signaling message is shown as follows:

```
Merging Message {  
    Payload Type (i),  
    first media info {  
        1st media ID (i),  
        1st media URL (b),  
    }  
    2nd media info {  
        2nd media ID (i),  
        2nd media URL (b),  
    }  
}
```

Figure 4: Merging signaling message

4.2. Switching signaling message

Switching signaling message is used to instruct the Interactive real-time media communication system to perform media switching upon the receipt of the request from the control server. The switching signaling message is shown as follows:

```
Switching Message {  
    Payload Type (i),  
    Source media info {  
        Src media ID (i),  
        Src media URL (b),  
    },  
    Destination media info {  
        Dst media ID (i),  
        Dst media URL (b),  
    }  
}
```

Figure 5: Switching signaling message

4.3. Grabbing signaling message

Grabbing signaling message is used to instruct the Interactive real-time media communication system to switch edge node for audience, for example, in mobility scenario. In the mobility case, the Interactive real-time media communication system may decide to switch a more suitable edge node for media pushing for an audience according the location information. The grabbing signaling message is shown as follows:

```
Grabbing Message {
    Payload Type (i),
    new media info {
        new media ID (i),
        new media URL (b),
    },
    error_code,
}
}
```

Figure 6: Grabbing signaling message

4.4. Pulling signaling message

Pulling signaling message is sent from audience to the edge node. Once the pulling signaling message is acknowledged, the edge node sends the corresponding media to the audience. The pulling signaling message is shown below:

```
Pulling Message {  
    Payload Type (i),  
    Media info {  
        Media URL (b),  
    }  
}
```

Figure 7: Pulling signaling message

4.5. Pushing signaling message

Pushing signaling message is sent from broadcaster or the requested audience for interaction to the edge node in order to start pushing media to the edge node. The pulling signaling message is shown below:

```
Pushing Message {  
    Payload Type (i),  
    Media info {  
        Media URL (b),  
    }  
}
```

Figure 8: Pushing signaling message

Thanks!