Demystified
OPEN SOURCE

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Agenda

• Context
• SRT Protocol Fundamentals
  • Protocol Flow
  • Packet Structure
  • Security / Encryption
  • Overhead & Latency
• Real-Life Implementations & Lessons Learned
• Q&A
Context & Requirements

- Content agnostic
- Latency "cautious"
- Stream integrity
- Content protection
- IT friendly

Latency / Buffer

Device A

SRT

Device B

Content

Latency / Buffer

NAK 2

NAK 5, 6

Content

Stream Integrity

Unmanaged Networks

Problem: Erratic Bitrate AND Frame Rate

Variable Bitrate

Constant Frame Rate

E.g. a Video Frame every ~33ms

Variable Bitrate

Constant Frame Rate

E.g. a Video Frame every ~33ms
Content Packet Structure

<table>
<thead>
<tr>
<th>20 Bytes</th>
<th>8 Bytes</th>
<th>16 Bytes</th>
<th>Ex. 1316 Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>UDP</td>
<td>SRT</td>
<td>Payload</td>
</tr>
</tbody>
</table>

Control Packet Structure

<table>
<thead>
<tr>
<th>20 Bytes</th>
<th>8 Bytes</th>
<th>16 Bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>UDP</td>
<td>SRT</td>
</tr>
</tbody>
</table>

SRT Control Information Field (Variable Length)
Security & Encryption

- DDOS Attack prevention
- AES 128/192/256-Bit Encrypted
- Payload encrypted with cipher in AES-CTR mode
- Secret / pass-phrase is not part of the protocol (application layer)

Caller / Listener Concept

### Diagram

**Caller**

**Listener**

- Firewall A
- Firewall B

**SRT Control**

**Content**

Device A

Device B

Curated by the Video Services Forum vsf.tv
**Caller / Listener Concept**

![Diagram of Caller / Listener Concept](image)

**Handshake Flow**

- **Caller**
  - Handshake Request
  - Handshake Response
  - Capabilities Announce
  - Capabilities Response
  - Media
  - Control
  - Shutdown

- **Listener**
  - md5 cookie against DDOS attack (Derived from RFC 4987)
  - Version
  - Encryption
  - Amount of buffer
  - Live vs File
  - Stream ID
  - Payload
  - Timestamps
  - Keep-Alive (if no content)
  - ACK / NAK
Ceiling & Overhead

bps

Ceiling

Transmitted Packets

time

Implementations & Lessons Learned

Multiple Layers of Firewalls
Implementations & Lessons Learned

Multiple External Facing Firewalls

Before Stream Multiplexing

- 5x SRT Streams

After Stream Multiplexing

- Single SRT Stream

Implementations & Lessons Learned

Stream Multiplexing

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Implementations & Lessons Learned

First Come First Served

LAN 1 in Montreal
LAN 2 in Hamburg

Public Internet

Media Gateway

End Point 1

End Point 2

Media Gateway

Route 1

Route 2

Bidirectional SRT Tunnel

Troubleshooting Tools

VLC Media Player
Timeline

- **Oct 2012**: Concept
- **Summer 2013**: 1st Demonstration
- **April 2014**: 1st Product Integration (v1.0)
- **NAB 2017**: Multiple Revs
- **2018**: 30+ Active Contributors

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**Thank You**

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