Haivision

Secure Reliable Transport (SRT) und SRT Hub

VCC November 13-14, 2019

Dresden

Justus Rogmann

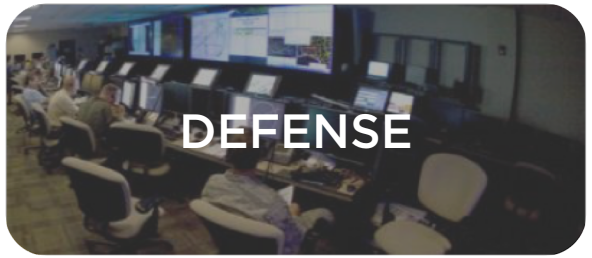
SRT Solutions Architect

Mission

Sichere, performante und hochqualitative Video-Streaming Lösungen für Ihr Unternehmen

Broadcasters
Media Companies
Sporting Leagues
House of Worship

Corporate
Financial
Medical / Healthcare
Government



Intelligence Surveillance
Reconnaissance (ISR)
Mission Systems
Civil Protection

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Wofür steht Haivision ?

© Haivision 2019

Haivision 2019

Corporate Headquarters

- Montréal
- Chicago

R&D Centers

- Montréal
- Hamburg
- Chicago
- Portland

Sales Offices

- Washington
- Atlanta

SaaS Managed Services

- Austin

Sales & Field Engineering

North America

- Boston
- Dallas
- Los Angeles
- New York
- Chicago
- Denver
- Montréal
- Philadelphia
- San Diego
- Seattle
- Tampa
- Washington

Latin America

- Sao Paulo
- Rio de Janeiro

Europe

- Mainz
- Hamburg
- Amsterdam
- London

Asia-Pacific

- Beijing
- Seoul
- Singapore
- Tokyo
- Shanghai

CHANNEL PARTNERS

- 300+ Globally

END USERS

- 25,000+ Globally

INSTALLED BASE

- 100,000+ Products Globally

VIEWERS

- 10,000,000+ Daily

Anwendungen & Referenzen

BROADCAST

Field Contribution

Remote Production

Live Interviews

Replay Systems

Anwendungen & Referenzen

BROADCAST

32 channel intercontinental remote production

Channel monitoring, return feeds, teleprompt with 300+ users

Live interviews; all stadiums, practice fields, remote analysts

Real-time collaboration with production team on location (GoT)

Live interviews; all stadiums, practice fields, remote analysts

80 24/7 channels to cloud syndication for OTT/MVPD

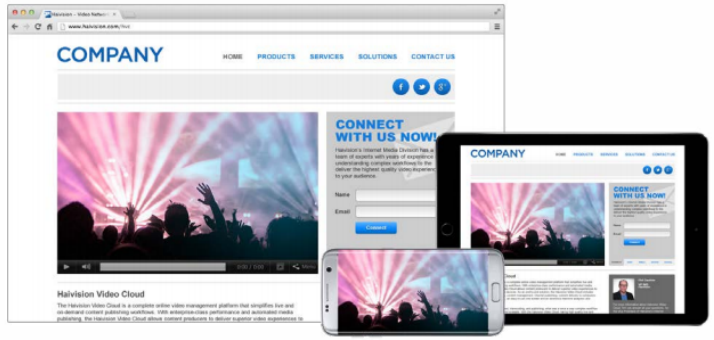
Return feeds & teleprompt for OTT only channel

Live in-stadium distribution for audience and regional production teams

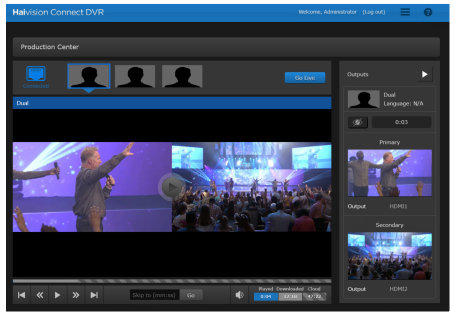
© Haivision 2019

Anwendungen & Referenzen

Kirchen



Gottesdienste On-Line



Multi-Campus Delivery

Multi-Campus Monitoring

LAKEWOOD CHURCH

World Changers

Elevation CHURCH

THE pottershouse CHRISTIAN FELLOWSHIP

REDEMPTION i.CHURCH

IGLESIA NI CRISTO CHURCH OF CHRIST

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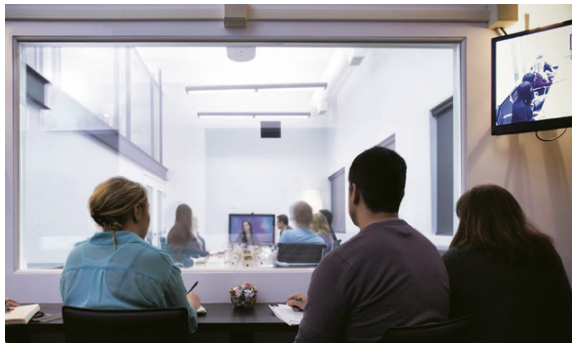
Anwendungen & Referenzen

Unternehmen

Global All Hands

Facility IPTV & Signage



Research Recording

NYSE · PNC BANK · citibank · Bank of America · RBC Royal Bank · BMW · BOEING · at&t

ZURICH INSURANCE · pepsi · MERCK · Microsoft · verizon · Duke Medicine · LinkedIn

SAP · Fidelity Investments · Walter Reed National Military Medical Center · Allstate · European Commission · NIKE · Boston Scientific · NOVARTIS

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Anwendungen & Referenzen

Unternehmen

Microsoft — All streaming for Inspire, Ignite, Build conferences

SAP — Streaming internal corporate events to global audiences

LinkedIn — Live remote production of LinkedIn Speaker Series

Allstate — Product and solution development review platform

BMW — Connecting all manufacturing locations for all hands interactivity

NYSE — Powering displays throughout the world's largest trading floor

RBC Royal Bank — IPTV to the desktop and wall displays to assist financial trading

Homeland Security — IPTV and signage throughout largest US civilian department

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Anwendungen & Referenzen

Militär

Situational Awareness

ISR Backhaul

Training & Ranges

Ministry of Defence

Canada

Ministerie van Defensie

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Anwendungen & Referenzen

Militär

Mission Critical Decisions: Delivering real time video across every network to the most important decision makers.

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Produkt Portfolio

MEDIA/CLOUD SOLUTIONS

Haivision Media Platform

- Enterprise – Multi-Standort-Streaming
- Site – IPTV/Signage
- Workgroup – Forschungsgruppen & Teams vernetzen

Haivision Video Cloud

- Internet Streaming und Verwaltung von Inhalten

Haivision SRTHub

- Live stream routing across Microsoft Azure

STREAMING SOLUTIONS

Makito X

Encoder

KB Series

Encoder/Transcoder

Kraken

Transcoder/Encoder

SRT SECURE RELIABLE TRANSPORT

Haivision Gateway

Transcode streams, bridge networks

Haivision Play

Set top boxes, media players, mobile & desktop applications

© Haivision 2019

Latenz

Millisekunden sind entscheident

für flüssige Interaktion sind unter

200

Millisekunden Latenz nötig

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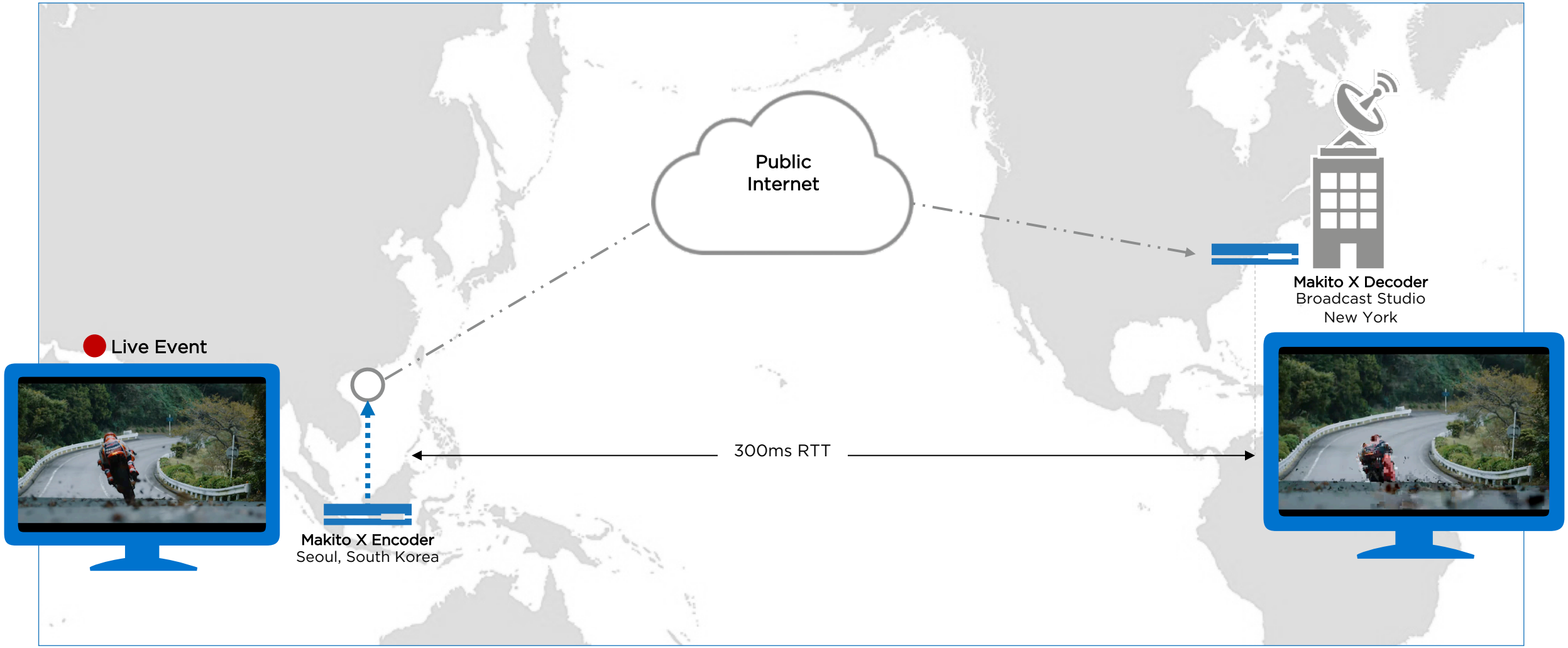
Haivision

Herausforderungen bei globalen Live-Events



Herausforderungen bei globalen Live-Events

Kann man sich auf das Internet Verlassen?

Wie kommen die Inhalte in die Cloud?

Muss man Routen Manuell bauen?

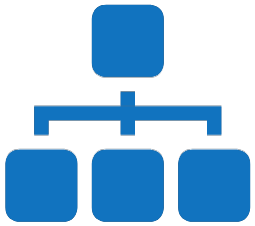
Ist der Workflow skalierbar?

Ist die Pflege der Infrastruktur aufwendig?

Integration in die Produktions-Umgebung

© Haivision 2019

Netzwerk-Optionen im Vergleich



	Satellit	MPLS Netzwerk	Public Internet
Latenz	☹	☺☺	☺
Bandbreite	☺☺	☺☺☺	☺
Einrichtung	☺	☹	☺
Kosten	☹	☹	☺☺☺

Probleme in der Übertragung

- Paket Verluste
  einzelne Pakete gehen verloren
- Jitter
  Pakete kommen zu unterschiedlichen Zeiten an
- Dauer der Übertragung
  kommen die Pakete rechtzeitig an?
- Bandbreite
  Schwankungen in der Übertragungs-Bandbreite

Protokoll-Optionen im Vergleich

UDP based

Beispiele: **TS, RTP**

Typisch für LAN Anwendungen

- Keine Sender/Empfänger Beziehung
- Streams warden vom Sender initiert
- Senden und beten - Sender weiß nicht, ob Pakete ankommen

Paket-Verluste verusachen Probleme im Video. Ein Ausgleich von Paket-Verlusten ist nötig, braucht aber extra Bandbreite und erhöht die Latenz

TCP/IP based

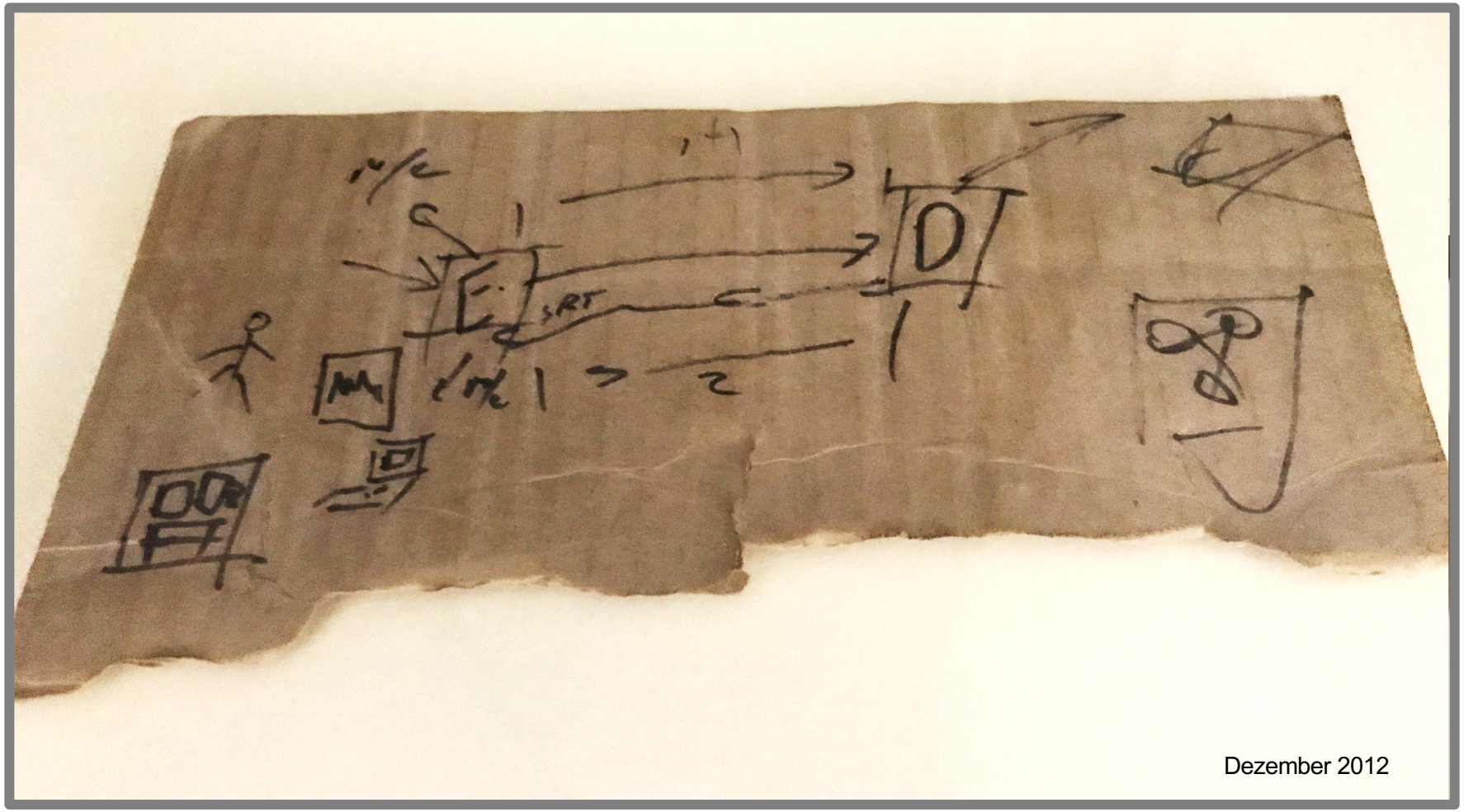
Beispiele: **HLS, DASH, RTMP**

Typisch für Internet streaming

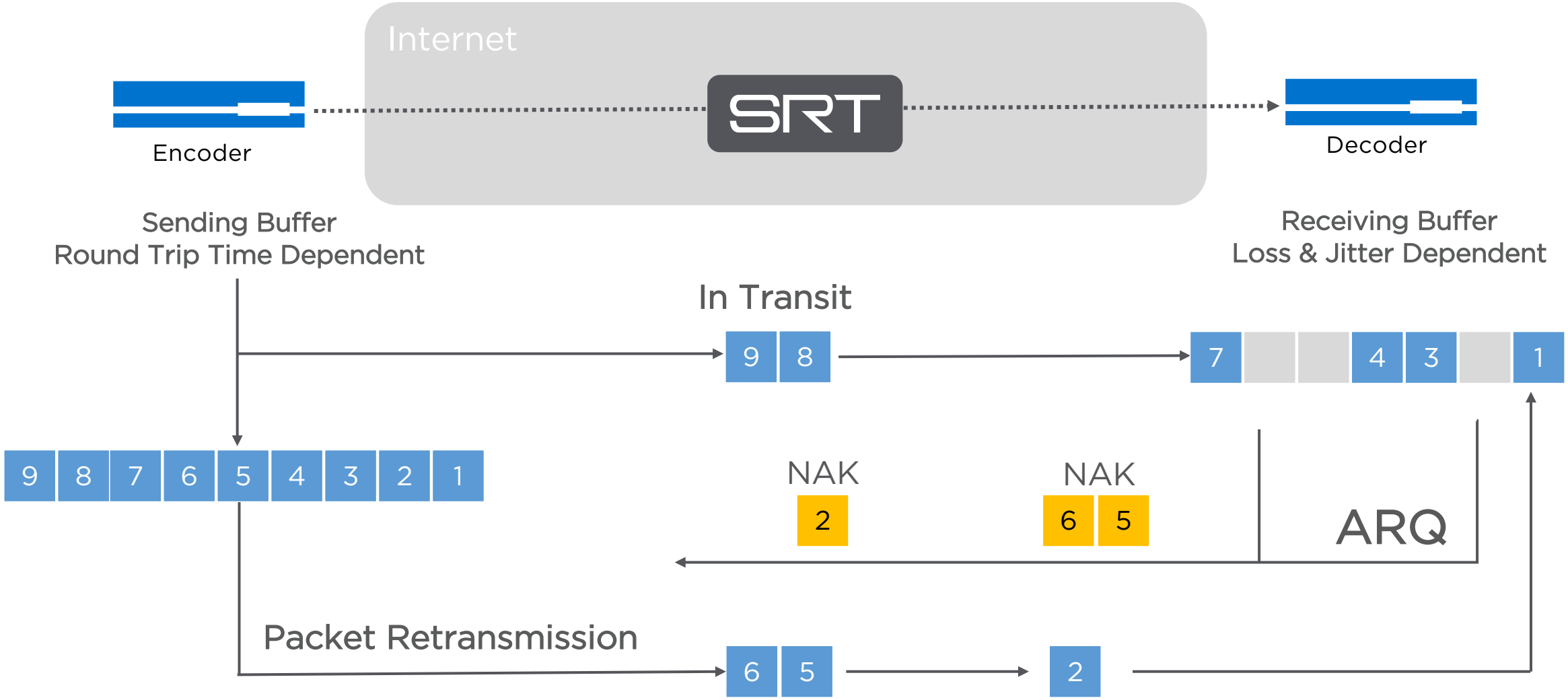
- Sender/Empfänger Beziehung
- Sender hält Pakete bis der Empfang bestätigt wird (ACK)
- Verlohrene Paket warden so oft gesendet, bis sie 100%ig ankommen sind

Basiert auf TCP/IP, Latenzen steigen bei Paketverlusten durch erneutes versenden

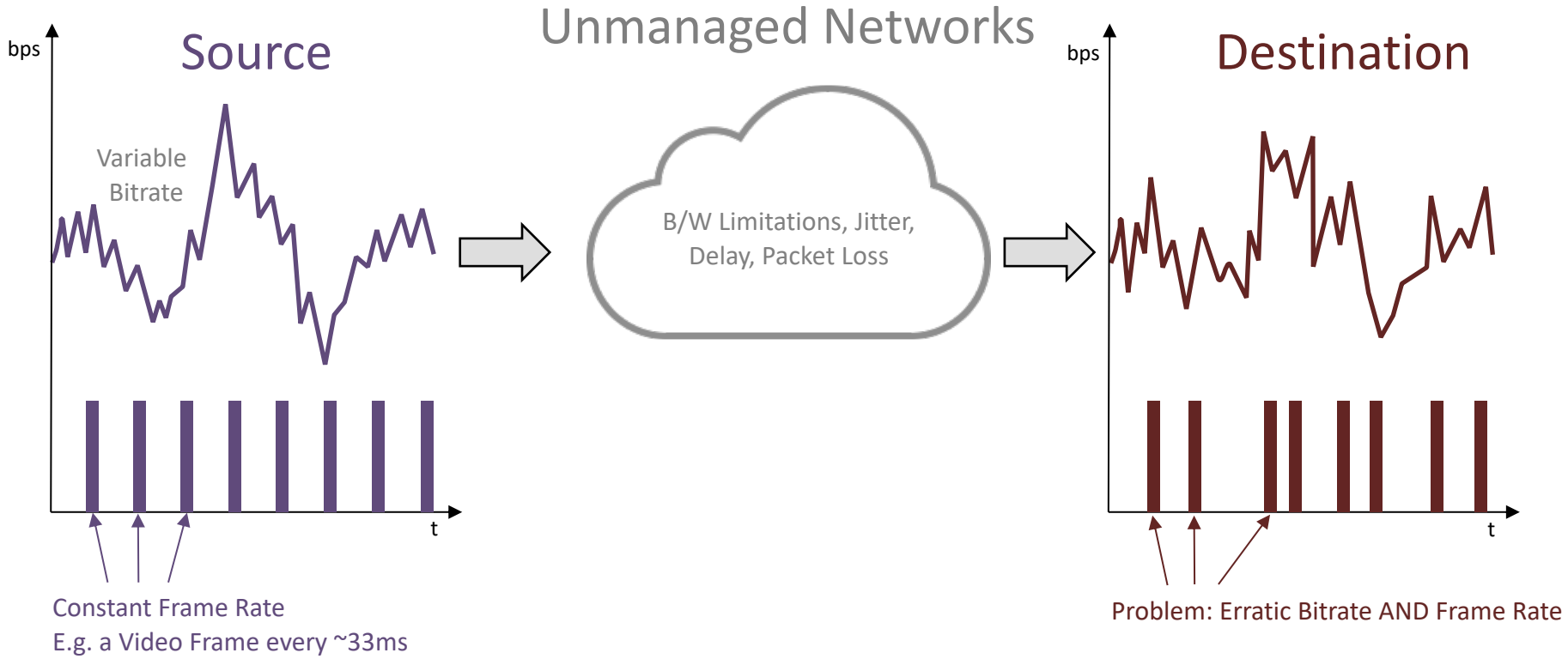
Die Geburt einer Lösung der Probleme: SRT



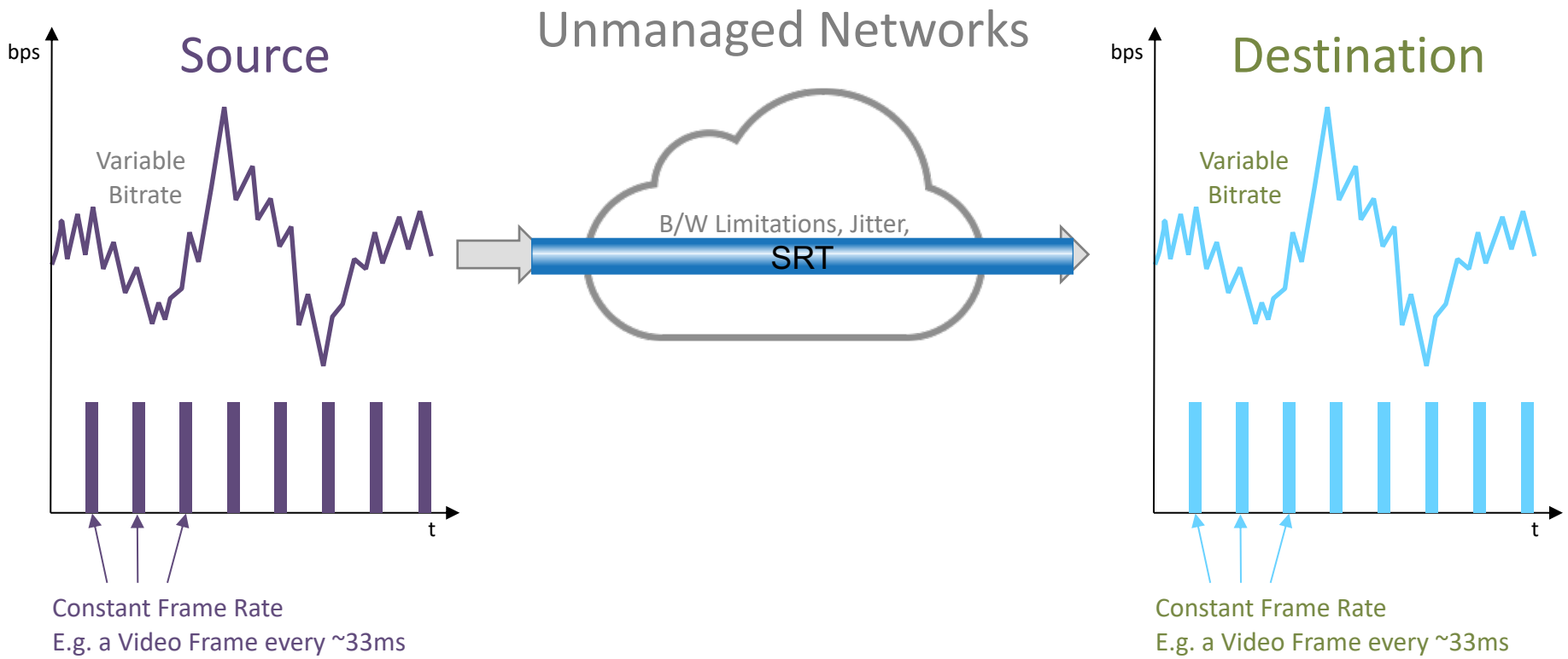
ARQ: Automatic Repeat reQuest,



Integrität des Streams



Integrität des Streams



SRT Secure Reliable Transport

Deliver high-quality, low-latency video across the public internet

Packet Loss Protection

Low Latency

Firewall Friendly

Secure

Open Source

2012
Conceived

2013
Demonstrated

2014
Productized

SRT Open Source

SRTALLIANCE
SECURE RELIABLE TRANSPORT

2017
Open Sourced

Microsoft

2018
Microsoft Endorsed

THE NATIONAL ACADEMY OF TELEVISION ARTS & SCIENCES

2019
Emmy Awarded

Over 300 Companies Support SRT

Today
Defacto Standard

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SRT Protokoll

Low Latency

UDP w/ARQ Streaming Protocol

Pristine Quality

Overcoming Jitter & Packet Loss

Content Agnostic

Codec, Video, Audio, Metadata, Messaging

Secure Streams

AES 128-, 256-bit Encryption

Firewall Traversal

Caller, Listener, Rendezvous

SRT | Open Source

SRT Alternativen

Transport layer

TCP · UDP · DCCP · SCTP · RSVP · *more...*

HLS or RTMP over TCP/IP

- Safe, using TCP/IP retransmit
- Slow, 5 – 30 seconds
- Lack of high quality decoders
- Potential for TCP congestion

Transport Stream over UDP with FEC

- Limited Packet Loss Recovery
- UDP Real-Time Behavior suffers
- Poor with jitter, reordering

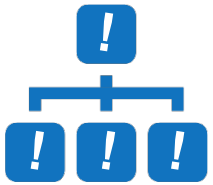
Transport Stream over SRT

- Highly Accelerated Packet Retransmission Algorithm
- Payload independent, time-stamped, encapsulation
- Optimized small buffering
- AES encryption

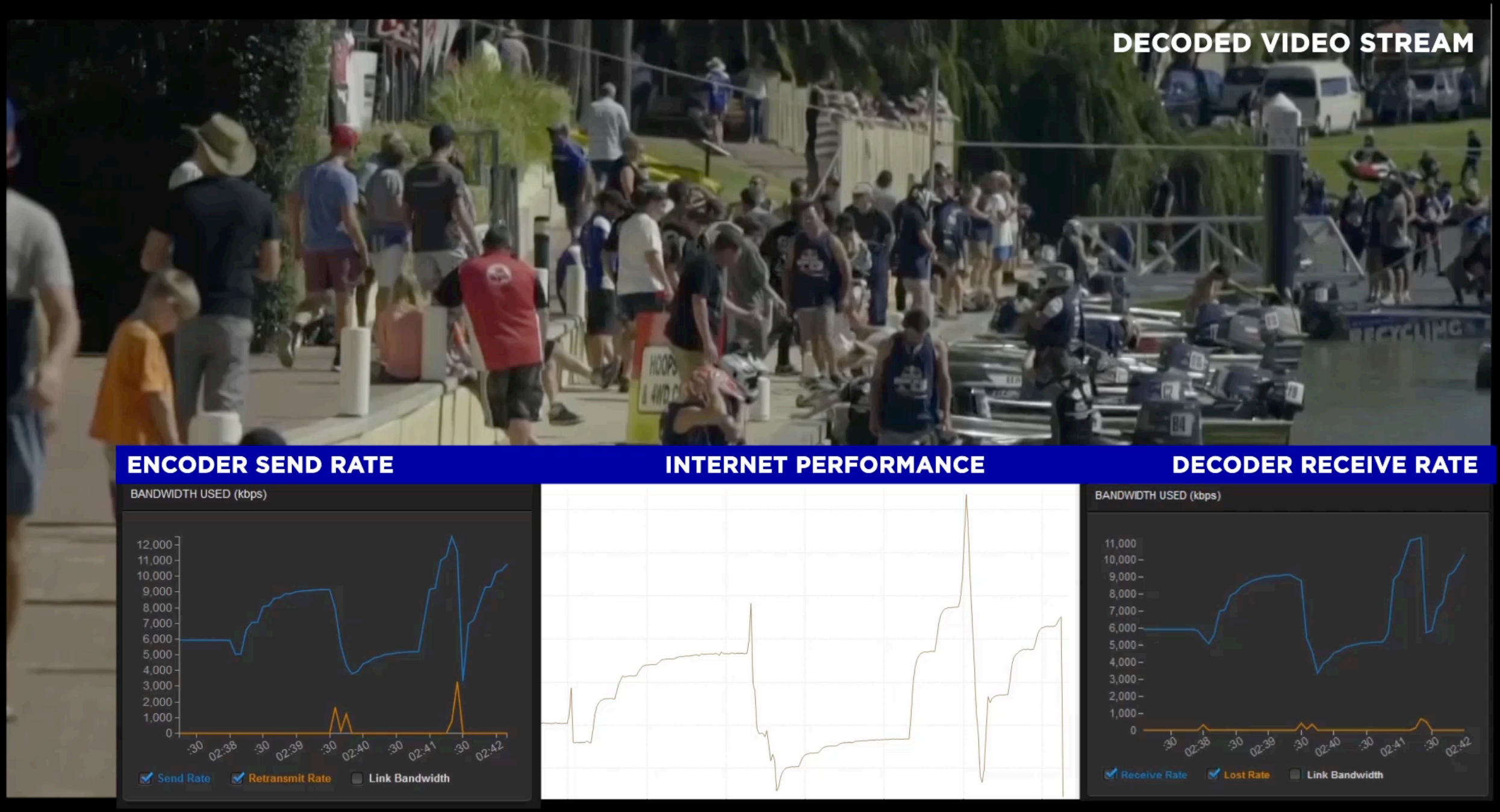
Network Adaptive Encoding

Mobilfunk
Bandbreiten
Schwankungen

schlechte
Wetterbedingungen



überlastetes
Internet


DECODED VIDEO STREAM
ENCODER SEND RATE
INTERNET PERFORMANCE
DECODER RECEIVE RATE
BANDWIDTH USED (kbps)
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
:30
02:38
:30
02:39
:30
02:40
:30
02:41
:30
02:42
Send Rate
Retransmit Rate
Link Bandwidth
BANDWIDTH USED (kbps)
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
:30
02:38
:30
02:39
:30
02:40
:30
02:41
:30
02:42
Receive Rate
Lost Rate
Link Bandwidth

SRT Alliance

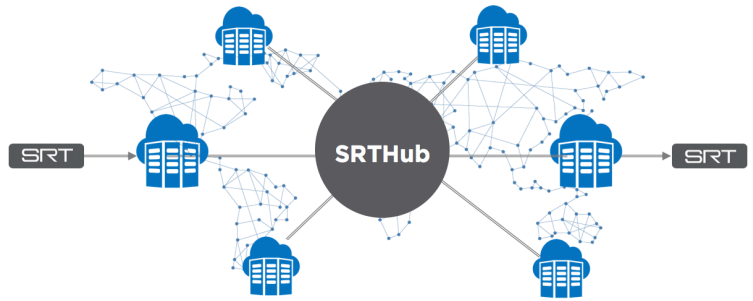
Microsoft	Hall 1 — 1.BS2, 1.C27
Haivision	Hall 14 — 14.G27
WOWZA media systems	Hall 14 — 14.E08
AVID	Hall 7 — 7.B55
ADTEC Digital	Hall 1 — 1.D01
agora.io	Hall 14 — 14.H06
AIREN	Hall 3 — 3.A50
amagi	Hall 2 — 2.B19
anevia	Hall 5 — 5.B66
Appear tv	Hall 1 — 1.C61
Cateme Transforming Video Delivery	Hall 1 — 1.D71
AVIWEST Shaping tomorrow's live video	Hall 2 — 2.B31
BirdDog	Hall 6 — 6.C11
BITMOVIN	Hall 14 — 14.E12
BRIDGE TECHNOLOGIES	Hall 1 - 1.A71
brightcove	Hall 5 — 5.B69
castLabs	Hall 14 — 14.A14
Cinegy	Hall 7 — 7.A01
CiRES21 LIVE STREAMING SOLUTIONS	Hall 14 — 14.B12
COLLABORA	Hall 14 — 14.D15
COMCAST TECHNOLOGY SOLUTIONS	Hall 14 — 14.A49
DATAPATH EXCELLENCE BY DESIGN	Hall 1 — 1.F27
Dream CHIP	Hall 11 — 11.B10
EMS Easy Media Suite	Hall 8 — 8.C92
EBU	Hall 10 — 10.F20
ENCOMPASS	Hall 5 — 5.B75
ENENSYS Networks	Hall 2 — 2.B51
epic labs	Hall 14 — 14.A05
Explorer	Hall 8 — 8.A34
exterity	Hall 14 — 14.C17
GATESAIR	Hall 8 — 8.D60
GLABS INTELLIGENT STORAGE	Hall 7 - 7.B26
harmonic	Hall 1 — 1.B20
Hexaglobe	Hall 14 — 14.A16
hiscale	Hall 2 — 2.A24
Imagine COMMUNICATIONS	Hall 2 — 2.A24
JVCKENWOOD	Hall 12 — 12.F31
KALTURA	Hall 2 — 2.B41
Limelight NETWORKS	Hall 5 — 5.B52
MAGEWELL Digital Video Essentials	Hall 8 — 8.A84
make.tv	Hall 14 — 14.A24
Marshall CAMERAS	Hall 12 — 12.D20
matrox Graphics for Professionals	Hall 7 — 7.B15
MEDIAEXCEL	Hall 14 — 14.G18
MediaKind everyone. everywhere.	Hall 4 — 4.A01
mog exceeding media challenges	Hall 7 — 7.A27
nablet	Hall 7 — 7.A06
NAGRA KUDELSKI	Hall 1 — 1.C81
netinsight	Hall 1 — 1.B40
Osprey Video	Hall 7 — 7.D19
pebble beach systems	Hall 8 — 8.B68
QUORTEX	Hall 2 — 2.A36
QVESTMEDIA THE LEADING SYSTEMS ARCHITECT	Hall 3 — 3.B40
RED BEE PART OF ERICSSON	Hall 14 — 14.D26
ROHDE&SCHWARZ	Hall 7 — 7.B21
sencore	Hall 1 — 1.F76
SINGULAR.LIVE	Hall 14 — 14.B08
speedcast	Hall 5 — 5.C45
StreamShark	Hall 14 — 14.A10
Synamedia	Hall 14 — 14.C41
telestream	Hall 7 — 7.C14
tellyo	Hall 14 — 14.B15
TERADEK	Hall 12 — 12.E65
videon	Pods — Pods.P49
watchity	Hall 14 — 14.B06
WISI	Hall 1 — 1.D37

SRT Hub

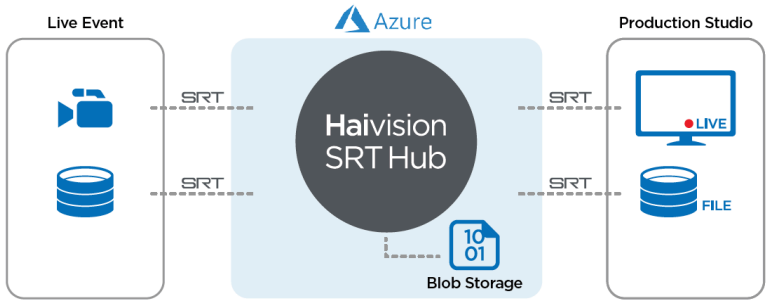
Intelligent Media Routing in the Cloud

Azure

Secure, Reliable Global Routing



Live- & File-based Workflows



Built for Broadcasters

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SRT Hub Overview & Dashboard View

SRT Routing Containers

Azure Cloud Reach & Scale

Quick View of Global Routes

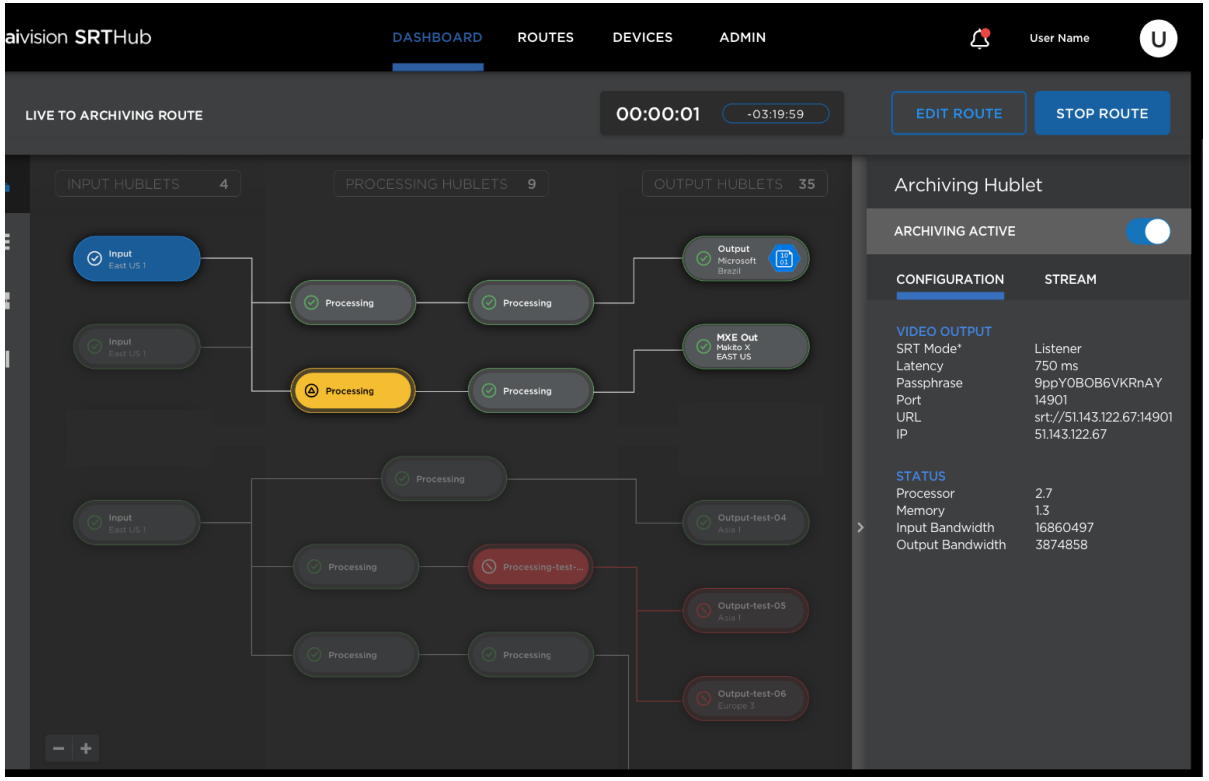
© Haivision 2019

SRT Hub Route Map & Hublets

Intuitive User Experience

Flexible Hublet Connectors

Scalable & On-demand



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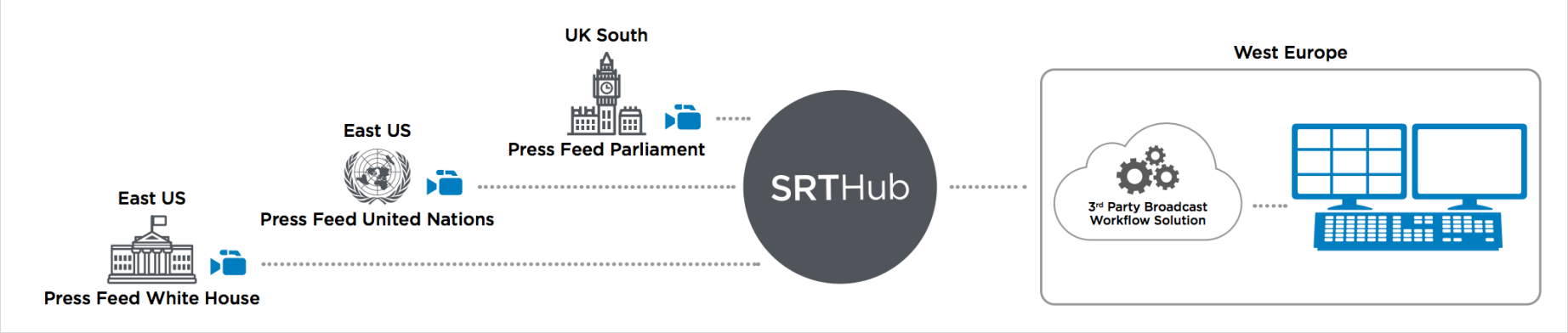
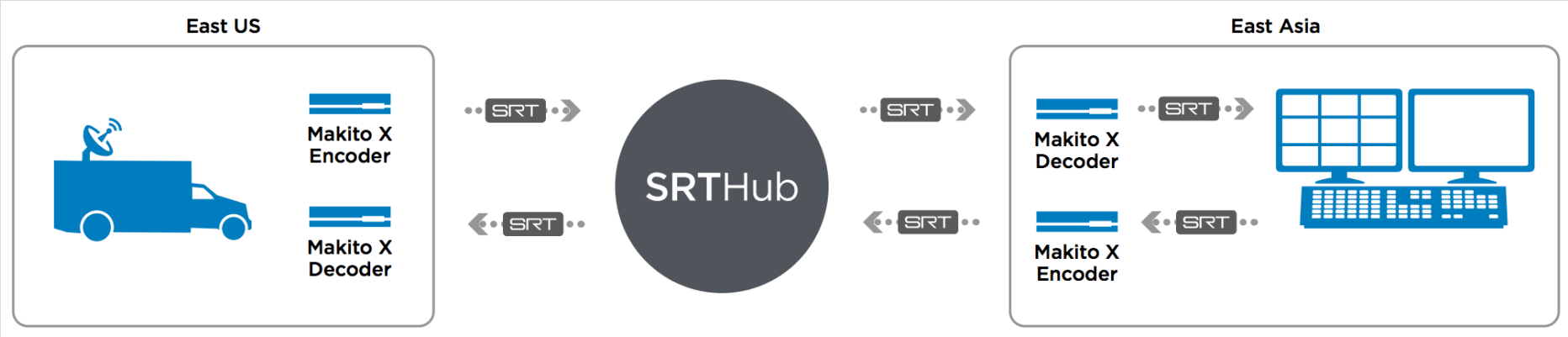
Example Use Cases

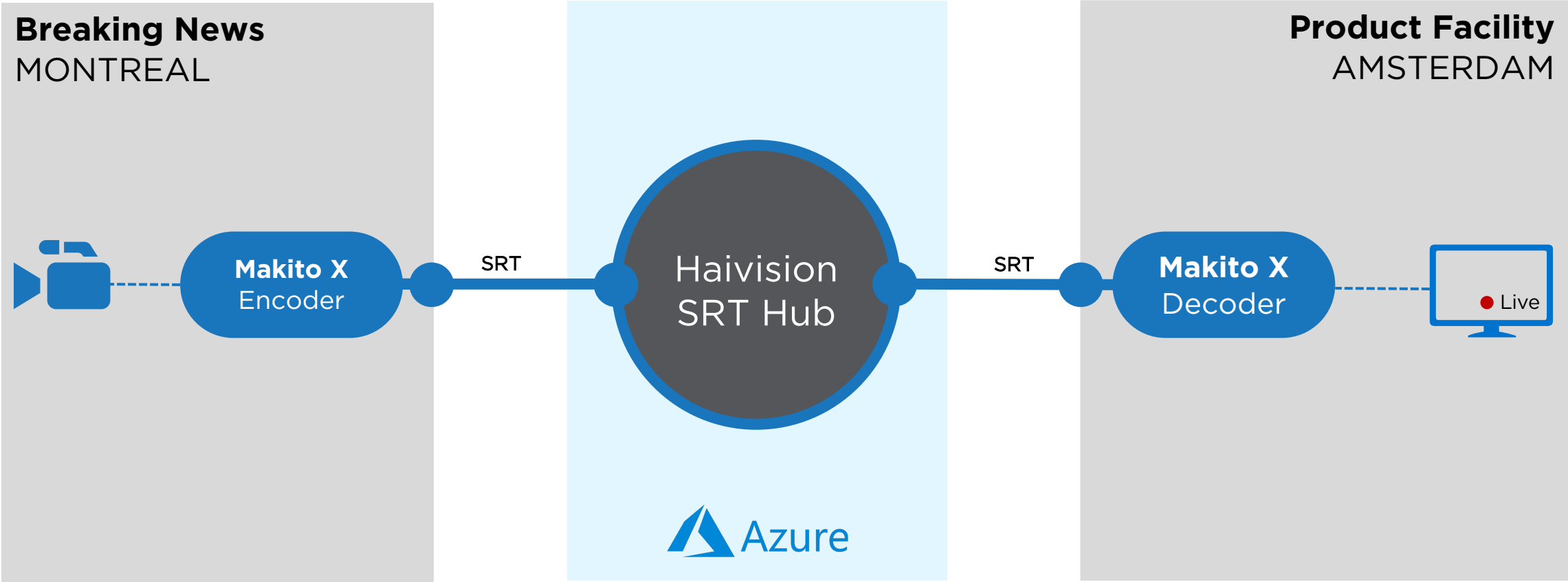
Field Contribution to Cloud-based Production





Field Contribution with Return Feeds

Setting Up an SRT Hub Route



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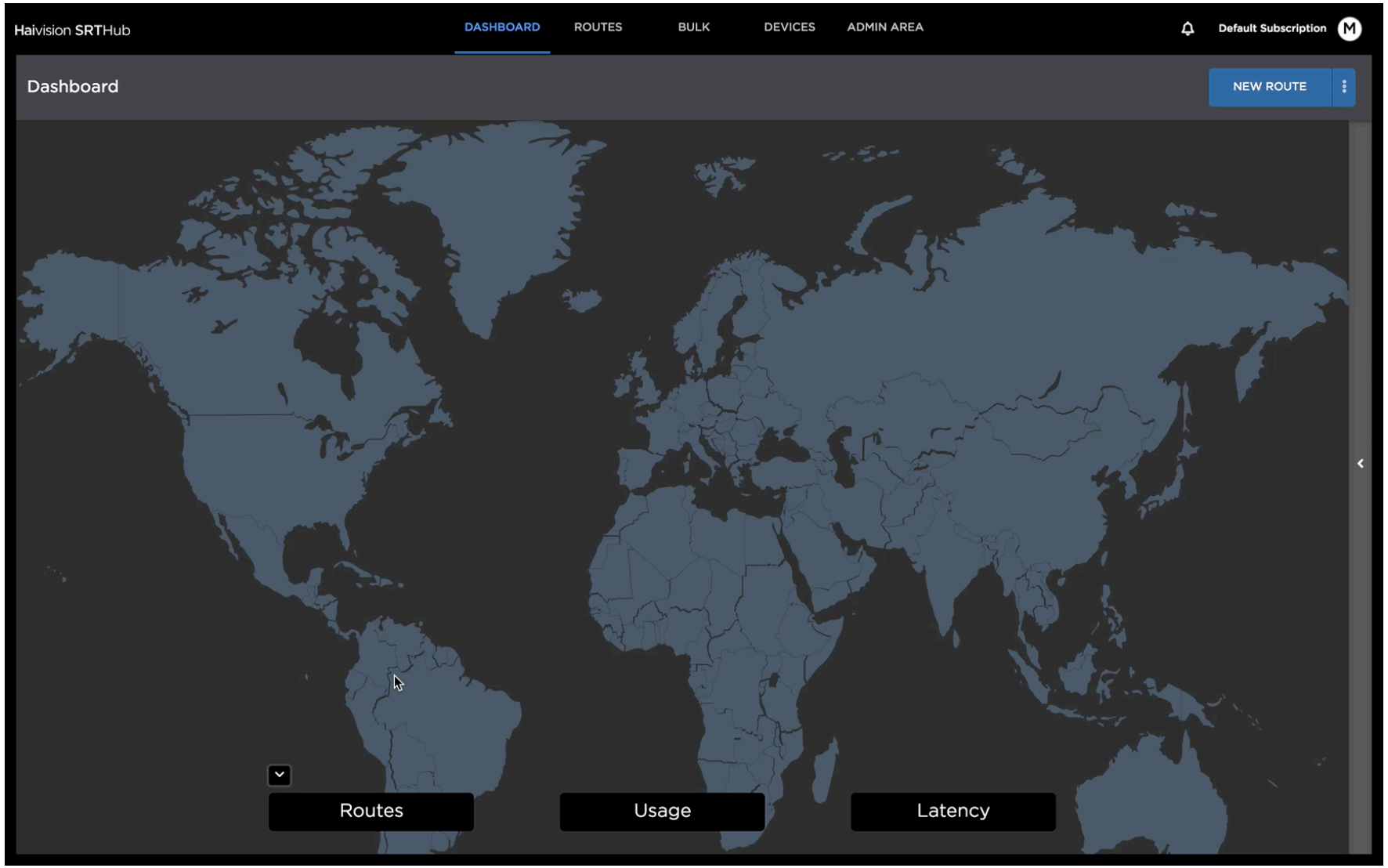
SRT Hub | Easy Routing from/to Anywhere



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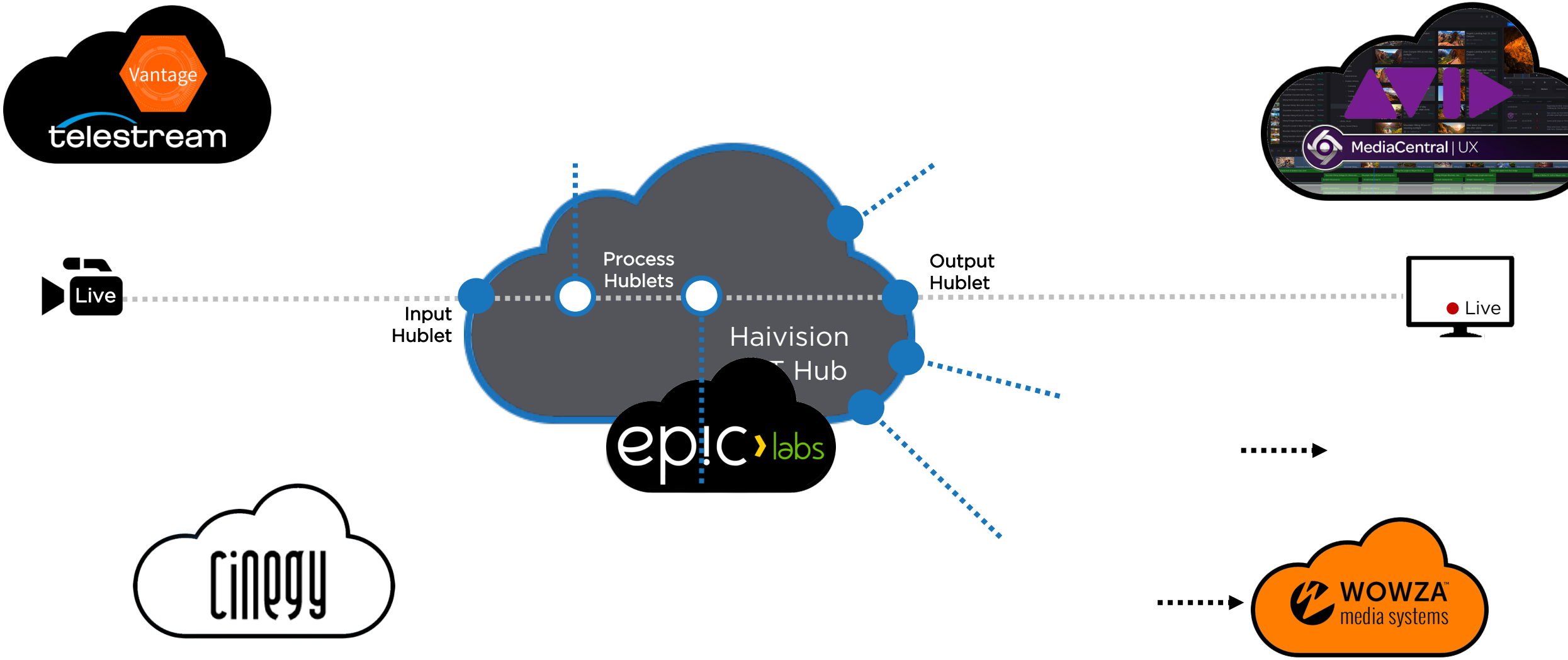
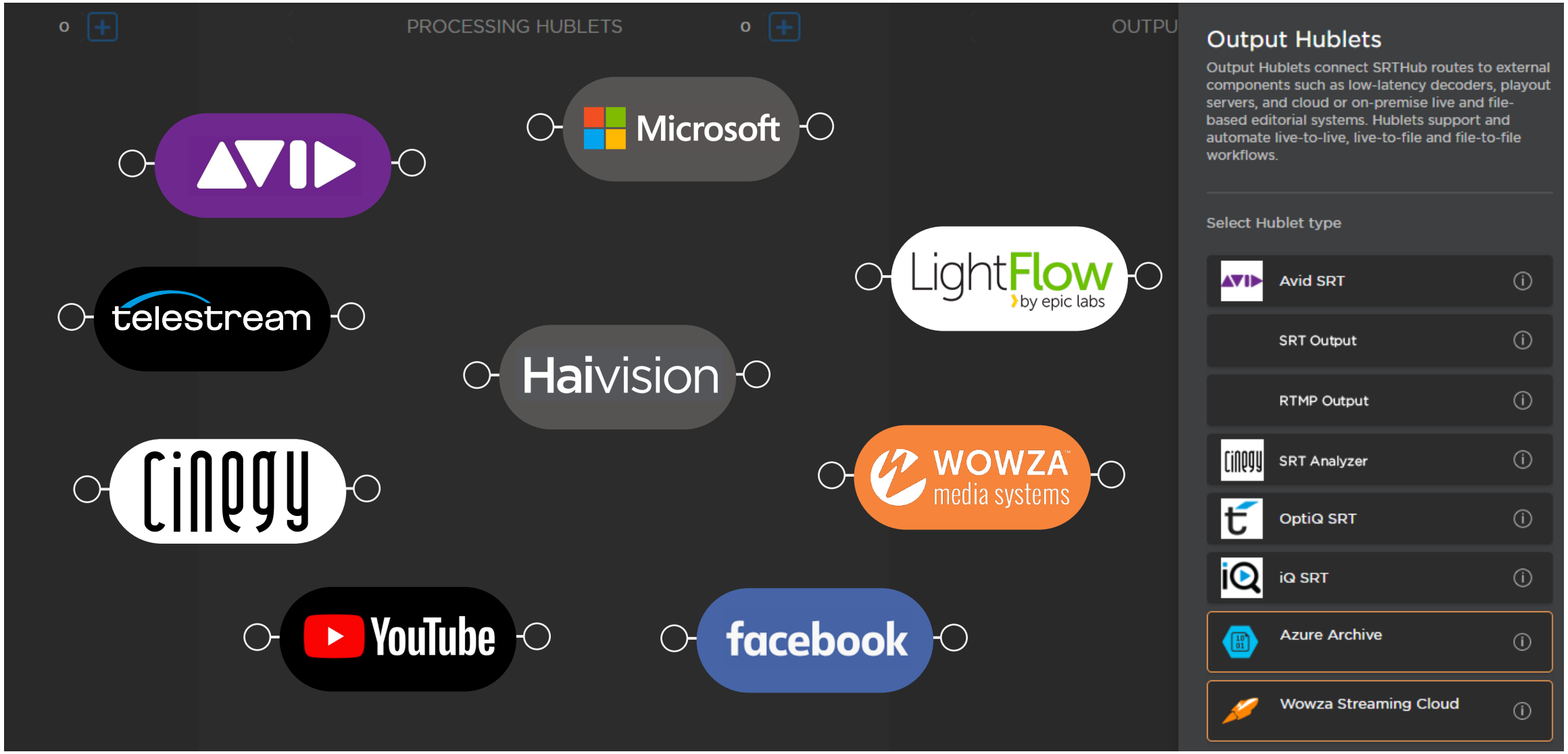
Connecting Production Systems in the Cloud



SRT Hub | Connected Broadcast Ecosystem



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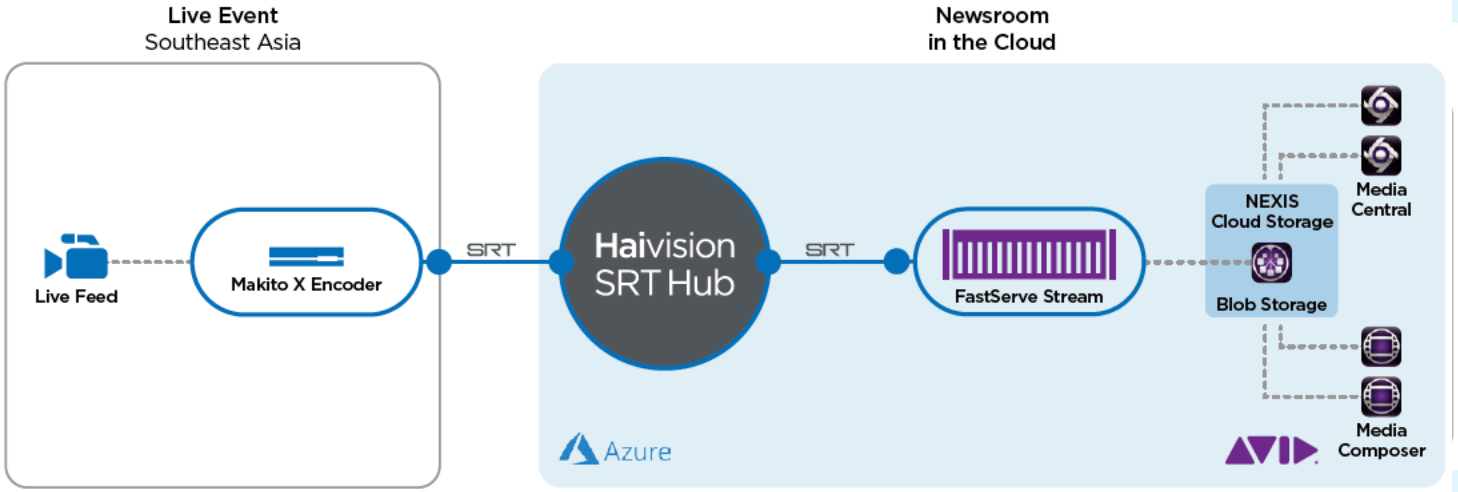
SRT Hub Partner Workflows | Avid

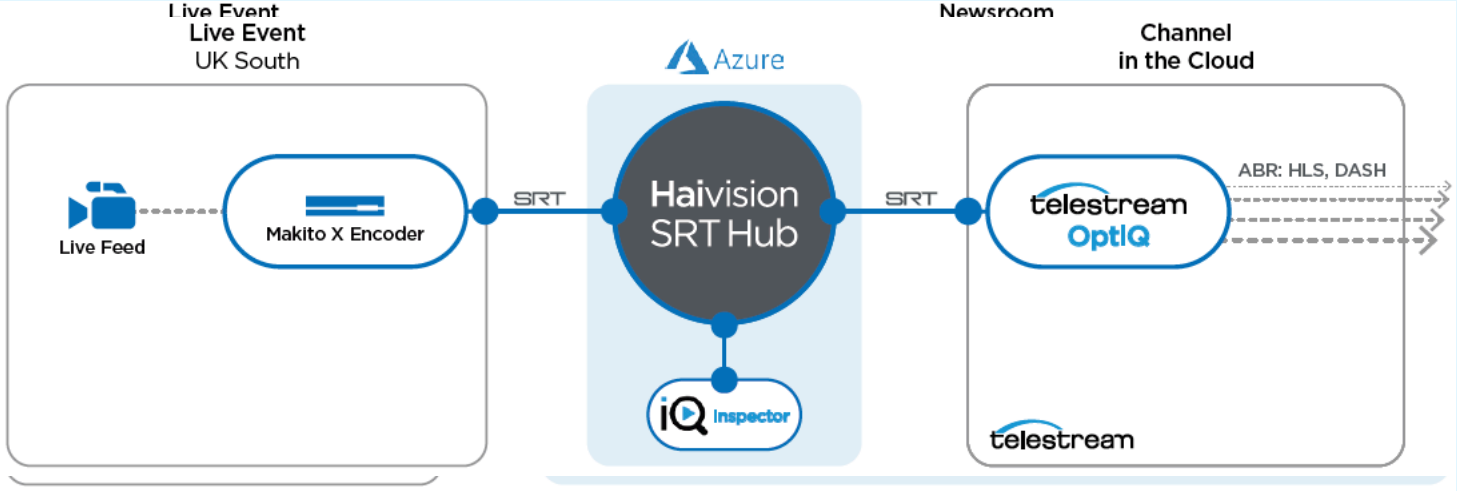
Live Event Newsroom Cloud Editorial



SRT Hub Partner Workflows | Telestream

telestream

Transcoding for Social Editorial



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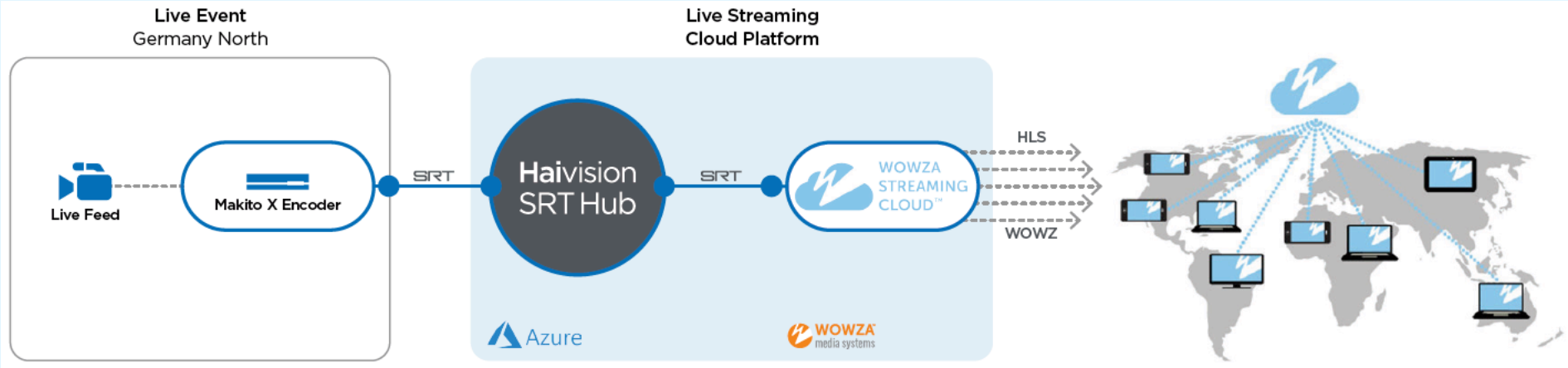
SRT Hub Partner Workflows | Wowza

Streaming to OTT



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SRT Hub | Intelligent Media Routing in the Cloud

SRT Protocol Routing

Azure Cloud Reach & Scale

Connected Broadcast Workflows

On-demand & Scalable

SRT Hub

Intelligent Media Routing in the Cloud

Azure

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Quality • Commitment • Bite

Justus Rogmann

jrogmann@Haivision.com