



RAVENNA

AES67 & ST 2110 built-in

Overview Brochure

Your way to AES67 & SMPTE ST 2110

RAVENNA is a solution for real-time distribution of audio and other media content in IP-based network environments. Utilizing standardized network protocols and technologies, RAVENNA can integrate and operate on existing network infrastructures. Performance and capacity scale with the capabilities of the underlying network architecture. RAVENNA is designed to meet the strict requirements of the pro audio market featuring low latency, full signal transparency and high reliability. RAVENNA is fully compatible with AES67 and the SMPTE ST 2110 standards.

WHY AUDIO OVER IP?

The tremendous scale of manufacturing in the data network world ensures large cost-savings on equipment. In addition, using network-based solutions for media transport enables broadcasters to leverage their existing infrastructure and achieve greater flexibility in content sharing and networking configuration. Since IP technology was originally designed to forward a large number of data packets without constraints towards real-time, it bears some handicaps for media transport applications compared to traditional technology. Despite these handicaps, which are of course addressed and overcome by RAVENNA, the benefits of using IP for media transport are increasingly too persuasive for broadcasters and service providers to ignore.

OPEN TECHNOLOGY

In the past, the pro audio market has seen numerous technological innovations created or invented by some of the most ingenious minds of our industry. Unfortunately, most of this valuable intellectual property ended up being used as proprietary or patented technology. It was apparent that a new audio distribution technology would not gain significant market acceptance if it was not supported by an ample number of different companies. Thus, ALC NetworX decided to make the underlying technology and mechanisms used in RAVENNA publicly available.

WHEN THE WORLD IS LISTENING...

Here's an interesting fact that you probably didn't know – over the last few years, many of the world's biggest and most important sporting and cultural events would simply not have been broadcast without RAVENNA audio networking. Broadcasters use RAVENNA audio networking every day, and praise its endless flexibility and ability to work in complex IT setups alongside other IP technology. These are the features that make RAVENNA the preferred technology for the most demanding audio requirements, where it is crucial that the audio performs flawlessly. The openness of RAVENNA, now adopted by more than 50 manufacturers, means it will be used when sound really matters.

MARKETS & APPLICATIONS

While primarily targeting the professional broadcast market, RAVENNA is also suitable for deployment in other pro audio market segments like live sound, installations and recording.

Possible fields of application include, inter alia, in-house signal distribution in broadcasting houses, theaters, concert halls and other fixed installations, flexible setups at venues and live events, OB van support, inter-facility links across WAN connections and in production & recording applications.

STANDARDIZATION: RAVENNA & AES67

While RAVENNA is already based on existing standards from the audio and IT industry, the goal was to create a new de-facto standard with RAVENNA itself. In September 2013, the AES released the AES67 standard on high-performance streaming audio-over-IP interoperability, which is built on the same fundamental principles as RAVENNA. Consequently, RAVENNA fully supports AES67-based stream exchange with other networking systems, but also provides superior functionality in terms of control, performance, flexibility and applicability. RAVENNA is also fully compatible with SMPTE ST 2110-30/-31.

TECHNOLOGY OVERVIEW

STANDARD PROTOCOLS

All protocols and mechanisms used within RAVENNA are based on widely deployed and established methods from the IT and audio industry, or comply with standards as defined and maintained by international standardization organizations like IEEE, IETF, AES and others.

FULL NETWORK REDUNDANCY

Although a modern network infrastructure can be configured to guarantee a high level of transport security and reliable 24/7 operation, a RAVENNA device can optionally support full network redundancy by exhibiting two or more independent network interfaces which can be connected to independent physical networks.

By duplicating any outgoing stream to both network links as defined in SMPTE ST 2022-7, play-out at the receiver will continue flawlessly and uninterrupted as long as data packets are received on any one link.

STREAMING

As IP has been chosen as a basis, it's only natural to use RTP for streaming of media content. RTP is widely used and supported by numerous applications and comes with a large number of standardized payload formats. This would even allow standard media player applications to potentially subscribe to RAVENNA streams.

Streaming is supported both in unicast and multicast mode providing the highest flexibility to match the distinct requirements of different applications. A receiver can subscribe to any existing RAVENNA stream through RTSP / SDP protocol, which is also supported by most common media players.

SYNCHRONIZATION

While simple streaming across a network can be achieved without any synchronization at all, in pro audio applications a tight synchronization between all devices and streams is absolutely mandatory. While playback synchronization in most applications requires sample accuracy, it has been the goal for RAVENNA to optionally provide superior performance by providing phase-accurate synchronization.

In RAVENNA, synchronization across all nodes is achieved through IEEE1588-2008 (PTPv2 Precision Time Protocol), another standard protocol which can be operated on IP. With PTPv2, phase-accurate precision as defined by AES11 can be achieved. Even between remote locations, when GNSS (i.e. GPS) is used as a common time reference.

QOS

As different services can co-exist with RAVENNA on the same network, it has to be ensured that RAVENNA streams will be expedited with priority. From various QoS schemes available for IP based traffic, for RAVENNA DiffServ was selected as the QoS mechanism, as it is widely supported by most modern managed network equipment.

IP

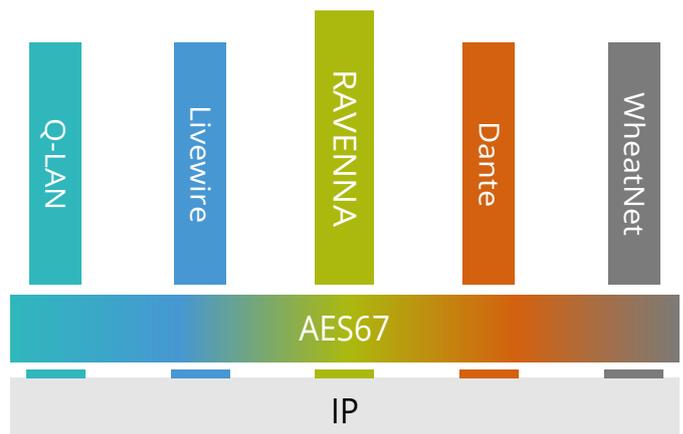
RAVENNA is an IP-based solution. As such it is based on protocol levels on or above layer 3 of the OSI reference model. IP can be transported by virtually any LAN and is used as the base layer for communication across WAN connections.

Although Ethernet will be deployed in most cases as underlying data link layer, IP in general is infrastructure-agnostic and can be used on virtually any network technology and topology.

AES67 & SMPTE ST 2110

Since all relevant standard ingredients of AES67 are either identical or very close to RAVENNA's operating principles, RAVENNA can naturally fully support interoperability as defined within AES67. While RAVENNA and AES67 share the same principles for synchronization and transport, AES67 packet setup and payload formats are functional subsets of RAVENNA. Since the RAVENNA technology framework offers performance and functionality beyond the AES67 interoperability guidelines, AES67 can be seen as one of many possible operational profiles for RAVENNA. Other RAVENNA profiles offer faster performance and lower latency capabilities, higher channel counts, better applicability to routed network environments or means of transporting different types of media.

Full compatibility with AES67 also provides full compliance with the SMPTE ST 2110 standard. The SMPTE ST 2110-31 part for transport of AES3 audio data has even been directly adopted from RAVENNA's AM824 specification.



THE ADVANTAGES OF IP

- The IP protocol is based on and works in conjunction with a number of widely deployed standards.
- IP as a transport protocol can operate on many different network infrastructures and virtually any existing network equipment; it is not bound to a specific technology or topology.
- Since IP traffic is not bound to the underlying physical transport layer, performance and capacity numbers scale directly with the capabilities of the network infrastructure.
- The IP protocol can co-exist with other network protocols; thus, different services can share a common network infrastructure concurrently.
- In order to minimize potential negative effects from the competing bandwidth requirements of other shared services on the network, effective Quality of Service mechanisms like DiffServ and VLAN are available in the IP domain.
- Since IP traffic can be routed across LAN boundaries, the A/V data streams can be accessed from within different subnets.
- Distribution across WAN connections can be made possible without leaving the IP domain.
- By using IP as a protocol basis, the convergence between the A/V and the IT world is accelerated. For example, PCs may participate in the A/V stream exchange and concurrently use other services – all through the same network connector.

RAVENNA FEATURES

- Precise media clock generation – no requirement for a separate house clock distribution.
- Sample-accurate play-out alignment across all nodes on the network.
- Concurrent support of multiple media clocks and data formats – streams with different sample rates and/or data formats may travel across the network without sample rate conversion.
- Full bit transparency for 16 and 24-bit PCM data.
- Fully bit-transparent AES3 signal format – preserving all meta data bits (e.g. even Dolby® E signals stay intact).
- Low latency – depending on network infrastructure, traffic patterns and stream configuration, sub-milliseconds latency is achievable.
- Operation on existing networks and in shared traffic environments possible – no dedicated network required.
- QoS based on widely deployed DiffServ scheme for prioritization in shared traffic environments.
- SMPTE ST 2022-7 redundancy optionally supported.
- Flexible configuration – streams may be individually configured in terms of data format, number of channels and bandwidth utilization.
- Unicast and multicast mode supported on a per-stream basis.
- Fully AES67-compatible – all fundamental operating principles and protocols of AES67 natively supported.
- Fully compatible with SMPTE ST 2110-30/-31 standard.



**RAVENNA**
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VENUES BROADCAST
MOBILE PRODUCTION
SPORTS EVENTS THEATRES
RECORDING ENTERTAINMENT

The Open Standard for Real-time Media over IP.

OPEN TECHNOLOGY PARTNERSHIP

Unlike most other existing networking solutions, RAVENNA is an open technology standard without a proprietary licensing policy. In order to emphasize this open approach, over the past years ALC NetworX has teamed-up with more than 50 renowned companies from the pro audio market to present a variety of RAVENNA-enabled products.

PARTNER STATEMENTS ABOUT RAVENNA

" We've been a RAVENNA Partner since day one. We were totally convinced by RAVENNA's open approach and its use of existing and publicly available standards. ALC NetworX had a vision of next generation broadcast technology and made it come to life. "

- **Claudio Becker-Foss**
CEO/CTO, DirectOut

" Genelec believes that making IP audio networking fully compatible with standards is the right, reliable and robust way of approaching the needs of the professional audio market. RAVENNA offers the path forward to open standards-based end-to-end IP solutions with sufficient quality for the professional audio world. "

- **Siamäk Naghian**
Managing Director, Genelec

" The entire RAVENNA development ultimately led to Lawo becoming what it is today: We enable world class content production by leading innovation in media infrastructure, cloud and workflow solutions. Lawo's vision of only one common network infrastructure for audio, video, monitoring and control is now a reality in broadcasting. "

- **Andreas Hilmer**
Chief Marketing Officer, Lawo

" AoIP solutions have increasingly become the only option for transfer of control and audio signals for live audio in complex sound environments. We believe in open technology standards, and RAVENNA presents a range of new possibilities for HOLOPLOT in terms of flexibility and the ability to work in complex IT setups alongside other IP technology – while ensuring that the audio performs flawlessly. "

- **Michael Hlatky**
Head of Engineering, Holoplot

" Switching to networked audio was a big decision for Merging and we were careful to evaluate the options available. It was clear that RAVENNA was the most open, advanced solution and could be more easily adapted to suit our client base. The alternatives would have been a retrograde step, stifling innovation. "

- **Claude Cellier**
President, Merging Technologies

" As a stand-alone technology, the RAVENNA framework provides an efficient and flexible solution for audio over IP transport. Its full AES67 compliance is an important fact for us and our customers. By extending our products' format support to include RAVENNA and thus AES67, we take a key step forward in delivering the many benefits of standards-based communications and signal-transport solutions. "

- **Thomas Riedel**
CEO, Riedel Communications

" Our BACH media networking technology is built on open standards like RAVENNA which allow competitive solutions from multiple vendors to best serve the market. RAVENNA has pioneered the road to interoperability by first embracing AES67 and now ST 2110 and we are proud to walk this road as part of the RAVENNA community. "

- **Bill Rounopoulos**
Business Development Manager, Ross Video

" We'd been looking for an open standard for IP audio connectivity for quite some time. It's bit-transparency and sub-sample accuracy, combined with its open nature, RAVENNA is the perfect technology for us. I'd like to think that one day, quite soon, all broadcast products will be able to talk to each other using RAVENNA. "

- **Marcus Brooke**
General Manager, Sonifex

About ALC NetworX

ALC NetworX is a technology competence center with its own R&D department in Munich, Germany. A team of experts with excellent reputation from the pro audio industry and in-depth knowledge in networking technologies has developed the RAVENNA technology platform. Although product implementations will be executed by individual partner companies, ALC NetworX will continue to keep the lead role in RAVENNA technology maintenance and ensures that RAVENNA technology evolves in full compliance with existing and emerging international standards.



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