Get the great digital sound of the 21st century on your radio

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The sound quality that the listener expects to hear from the radio depends on what they hear daily on other media.

That's why we liked the sound of a radio.
AM when we compared it ago

70 years of 78 rpm vinyl records

But we had to switch to FM broadcasting when Long Play records arrived.

Later, Compact Discs and streaming platforms appeared.

And that's why today's listener expects the radio to have the same digital sound quality that he gets listening to a CD at home or through Tidal and Spotify.

Radio stations that fail to meet these standards are left out of the preferences of their listeners.

How did analog radio evolve?

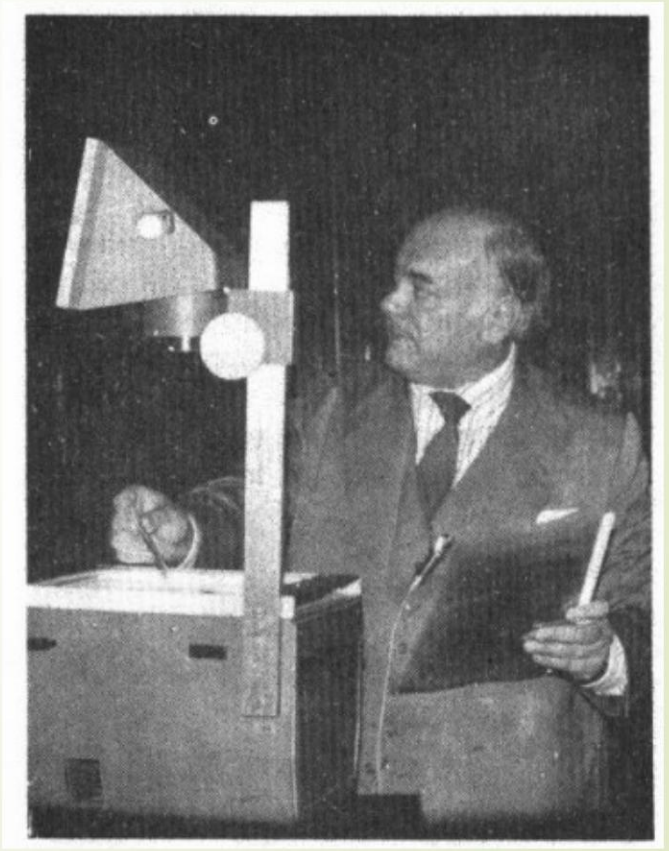
History teaches us that radio broadcasting began around 1920 with valves and progressed with transistors for almost 70 years, led by the US and Europe.

Until an Argentine invention brought radio into the digital world.

Well, on June 27, 1989 it is presented

worldwide the Audicom® system in the

Secretariat of Communications of Argentina



It was the first digital device to enter a radio starting the era of digital radio

Recording and playback on a PC eliminated the magnetic tape and cassette recorders used for half a century.

So that the world could use it freely Solidyne declared them public domain, without patenting them.

The birth of digital transmissions

The use of Audicom and the Compact Disc led listeners to demand higher quality radio sound at the beginning of this century. This led to the emergence of digital broadcasting with systems such as DRM, DAB+/Eureka in Europe, and HD Radio in the USA.

However, they were not well received because listeners needed expensive special receivers ***and digital transmissions offered better sound than analogue, but without reaching CD quality ,*** since they needed to use MP2 or perceptual coding.
AAC+ which prevents having “CD quality”

Later, online radio appeared, which uses streaming, without going on air.

The idea is good and allows for the creation of unlicensed radio stations by not having use of the RF spectrum.

A few of them were very commercially successful.

But their audience level is low compared to traditional FM because they cannot be heard from car or home receivers.

In terms of **sound quality, it's similar to an analog FM radio.** It's even worse when using YouTube because it recompresses it according to its own algorithms.

Let's review our conclusions

CONCLUSION-1: It is clear that listeners are willing to pay more for better sound but only in a few places in the world do they have enough money to do so.

CONCLUSION-2: Digital broadcasts are not yet “CD quality” as they are limited by the use of perceptual coding.

CONCLUSION-3: European experience indicates that the migration from analog to digital FM is ongoing. In countries like Switzerland, there are already more DAB+ radios than analog FM radios.

WHAT WOULD BE THE PERFECT SOLUTION?

WITHOUT A DOUBT: TO BE ABLE TO CONTINUE USING OUR CURRENT ONES RECEIVERS BUT TRANSMITTING WITH CD QUALITY

Can our analog FM receivers handle digital sound quality?

Modern FM receivers use digital technology, employing *baseband spectral translation and DSP processing* to reduce the frequency of the FM band and then digitally process the L + R and L – R signals, providing CD-like quality. This is done with a single chip and eliminates the need for coils and filters found in older analog receivers. We see that receivers are more advanced than FM stations.

The big news:

Today it is possible to reconvert FM Analog to *Digital FM*

With the sound of a compact disc but maintaining the analog FM modulation to use the same transmitter, cables and antenna, so the listener continues to hear with current receivers.

Therefore the solution we propose is to convert our current analog FM into a

Digital FM for CD quality listening

To do this we will only have to make: **2 modifications to the radio**

Modification #1

Use an IP digital audio console designed for Digital FM and preferably with technology *Stand* Alone

Let's see what we should look for in a digital radio or TV console.

ÿ **If it is to be used on a television channel, a recording studio or a high-audience FM radio station, it may need to be 24 channels.**

SOLIDYNE UNIDEX UX24 /24 FADERS FOR TV STUDIO OR RECORDING WITH 3 X VIDEO MONITOR SAMSUNG 19 INCHES

In FM radio stations 24 channel consoles with 12 faders are sufficient.

Note that a good console never leaves cables visible.

But today the most used in radios

FM, due to their low cost, are the 18 channels with 10 faders with technology

Small "Microphone Group" with Dante network.

They handle from 5 to 13 microphones and a total of 78 inputs + outputs

How to make sure the console will provide you with a Digital FM radio?

Be sure to ask

to your

supplier that

meets the

following

4 conditions

1-- ask your supplier

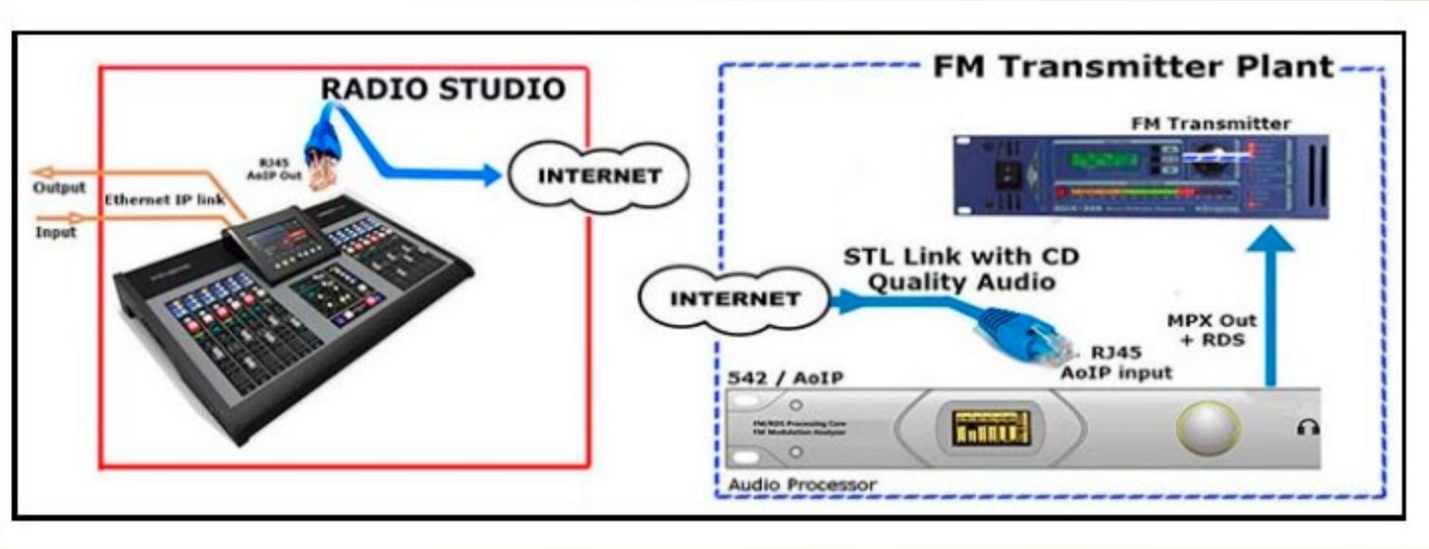
If it is a console designed for Broadcasting with air light outputs, with MIX Minus for Telco and *muting* of monitor speakers when turning on the Mics.

NOTE: There are consoles designed for sound in shows that do not meet broadcasting standards.

2-- ask your supplier

If the console has a built-in digital output AoIP for direct audio transmission to the transmission plant using a VPN or Port Forwarding

If your transmitter is far from the studios this is essential to maintain digital quality.



3-- ask your supplier

If the console allows you to manage telephone and cellular communications via Bluetooth from the console panel

It is very important to manage telephone and cell phone channels with WhatsApp to communicate with everyone from the console itself without adding annoying external Hybrids that are difficult to operate.

4-- ask your supplier

If the console has a video camera controller to automatically focus on the speakers who are speaking

ÿ If your radio station doesn't broadcast video yet, it probably will later.

It is important that you have automatic camera switching.

Now you know which brand of console you will buy!

Let's continue with a suggestion that is NOT mandatory.

“ “I don’t want to see a single cable”:

let's use

Dante AES67

IP audio interconnection via LAN network

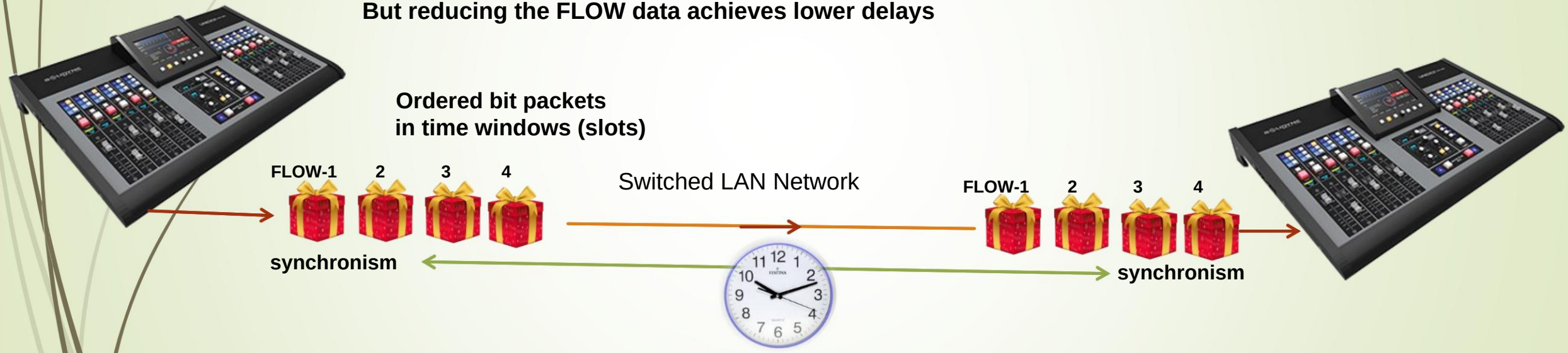
ÿAs new technologies appear, wired interconnections become more complicated…That's why in radios that have several studios we recommend that the console uses AES67 networks.

Dante AES67 Principles of Low Latency Networking

(If you're not interested in the technical details... you can skip this comment)

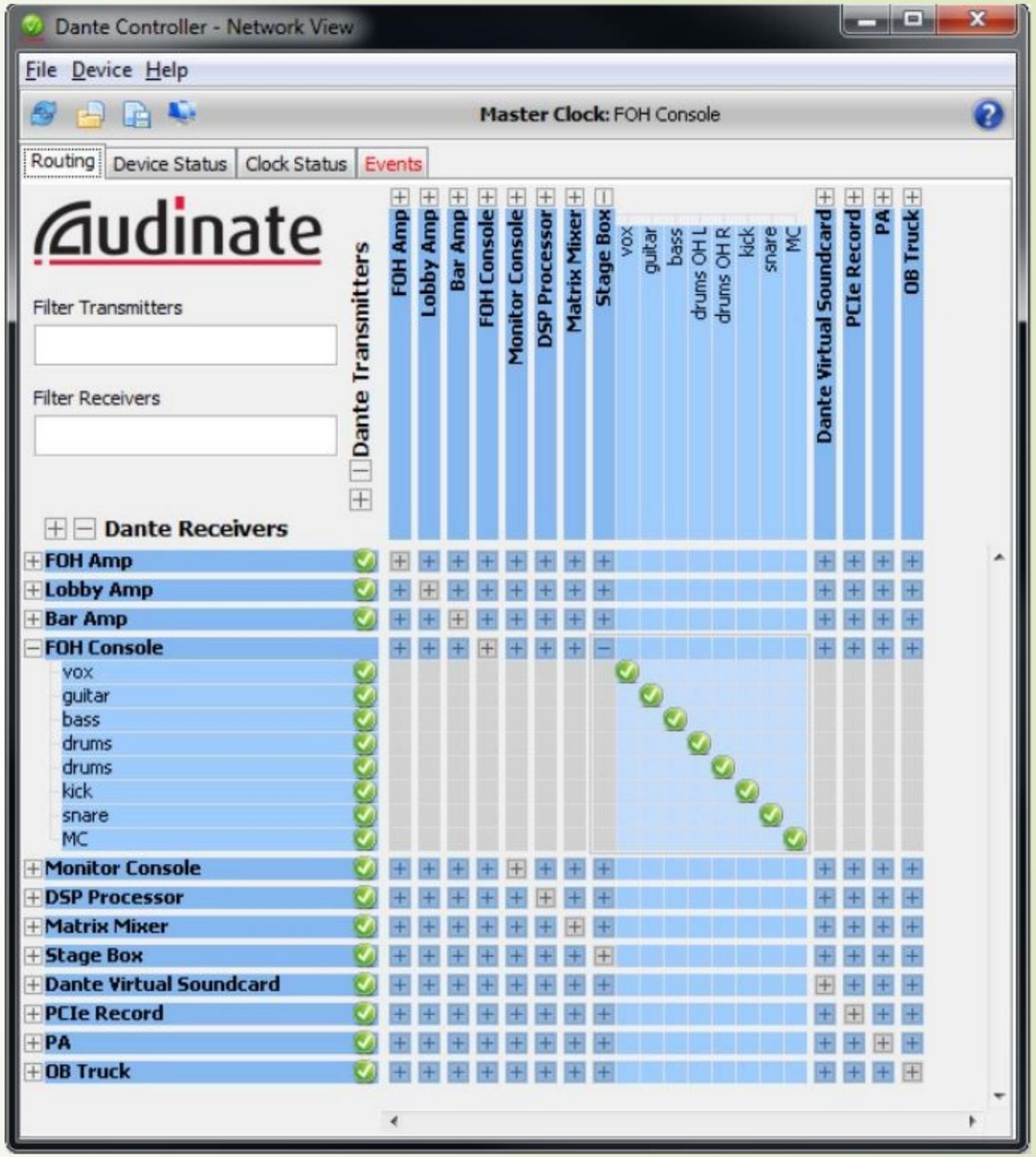
Transmission is achieved by encapsulating the audio data (payload) with stream addressing. The more audio data each stream contains, the more efficient the communication will be.

But reducing the FLOW data achieves lower delays



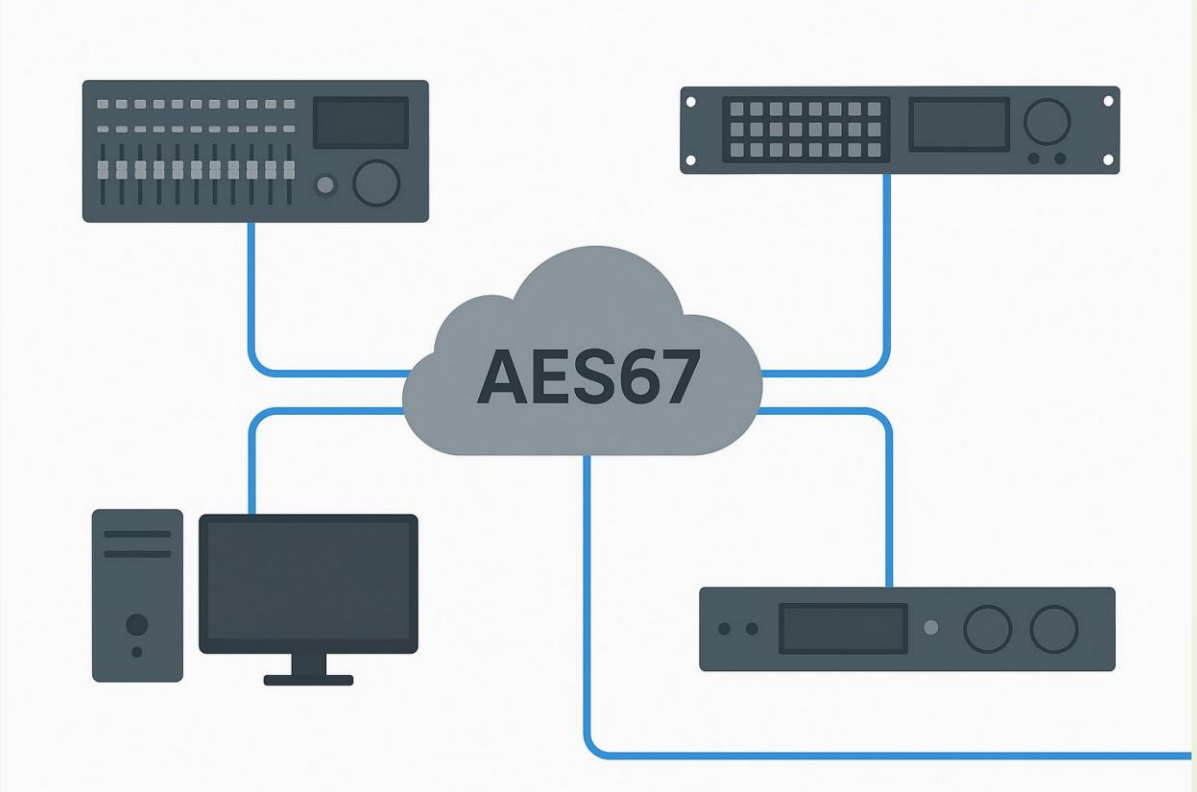
Data packets are sent and received on the LAN with a synchronized clock on all devices accessing the network. This way, they are transported with delays of less than a thousandth of a second, because they do not need to wait for acknowledgment signals. It is possible to manage 1024 channels on a 1 GB network. Any of the 512 transmitters can be received by all 512 receivers.

Radio LAN network



With Dante Controller software, you can view the entire network of devices, up to 1024 channels. With a simple click, you connect the channels that receive or transmit signals, replacing the old *patch panels.*

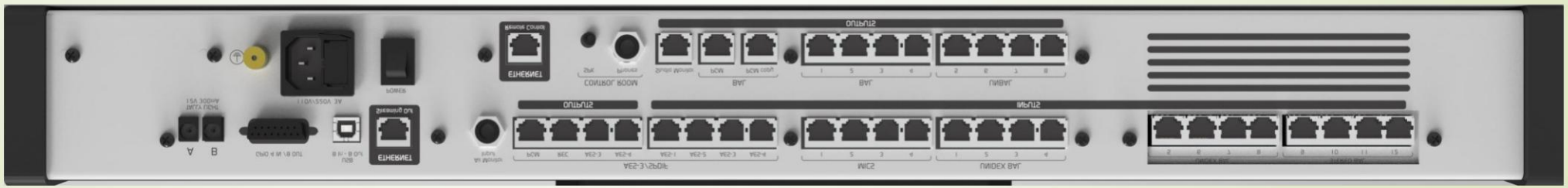
AES 67 standard networks such as Dante allow numerous devices to be interconnected.



It is important that the AES 67 network is for adding connections and not for replacing high-reliability physical cabling.

ÿ Some digital consoles **require** an AES 67 network to operate. This is more expensive and difficult to install, requiring much more cable. If the network goes down, **the radio is off the air.**

ÿ That is why today *Stand Alone* consoles are preferred , as they can never be off-air because, simultaneously with the AES67 network, they have digital audio connections with inputs and outputs on the console that are invisible when installed.
In addition to absolute security, it simplifies installation.



Modification #2

Let's use an audio processor suitable for digital FM

The audio processor is the key to making stereo FM, which is analog, heard by the listener as digital sound.

If your current digital audio processor does not offer monitoring transmission... you will have to leave it for emergency and buy a new one

Audio processors are based on psychoacoustics, which studies how the human ear perceives sounds.

Audio processor manufacturers are like violin or concert piano makers. ***Our years of experience are essential.***

To find a good processor let's see who has more experience

Let's ask ChatGPT to create a timeline of FM audio processor manufacturers.

This is the answer of the ChatGPT searches for the oldest FM audio processor manufacturers

We should note that only three firms remain in the market. Orban and Solidyne are the are most experienced, followed years later by Omnia.

Timeline – FM Audio Processors

1927 – CBS (USA) Withdrew from the market

Columbia Broadcasting System Founded.

ÿ 1960s: Launches **Audimax** and **Volumax.**

1967 – Orban (USA)

ÿ Founded by Bob Orban.

1970s: The **Optimod 8000 emerges.**

1968 – Solidyne (Argentina)

Pioneer in Latin America.

Exports FM/AM processors worldwide.

1975 – Aphex Systems (USA) Withdrew from the market

Creator of the **Aural Exciter.**

Expands into broadcast processing.

1985/1997 – Omnia (USA)

1985: Telos Systems founded. 1997:

Omnia Audio brand launched for FM and HD Radio.

What does a monitored audio processor mean ?

This technology, created by Solidyne and published in January 2024 in the AES Journal, **is free** for all manufacturers to use.

Monitored processors are distinguished by having an FM receiving antenna to monitor RF transmission using a digital receiver and an internal computer.

Why is it necessary for the processor to be monitored to have digital sound quality ?

Monitored processors, also called **FM MAPS ,** allow you to obtain an excellent stereo sensation, characteristic of the sound of a CD, because they increase the separation of L and R channels.

This separation is usually not correct due to the standing waves of the transmitter, coaxial cable, and antenna. This is the main reason why, even with the best equipment, a radio cannot transmit digital quality over analog FM.
MAPS technology allows you to correct the modulus and phase of the MPX stereo signal and measure the results until you achieve a perfect fit for CD digital quality.

What other advantage do FM MAPS processors have?

A-- An important advantage is that it allows you to switch the processing *presets* from **music** mode to **voice** mode when opening the microphones, achieving extraordinary sound quality in the voices of the announcers and at the same time in the music by having individual adjustments.

B– It also allows the operator to press a button on his PC screen to switch the transmission to MONO to quadruple the effective radiated power, meaning that a 1 KW radio has the same range as a 4 KW radio.
This is done automatically or manually in certain programs (for example news or reports) to have greater reach and defense against interference.

Remote monitoring and adjustment with FM MAPS

FM MAPS processors allow remote adjustment by listening to the sound. To do this, they broadcast the processed audio in real time from the city where the processor is installed via the Web RTC protocol. This way, the manufacturer or sound technicians can make adjustments by listening to the transmitted sound (with CD quality) from any city where the processor is installed.

The FM transmitter and its radiating system

During the 60 years in which radios used analog audio consoles, transmitters had distortions on the order of 2% with a dynamic range of only 55 dB.

But when radio stations began to use Audicom or similar digital technologies, transmitter manufacturers, like Sleeping Beauties, awoke from their slumber. Starting at the end of the last century, they continued improving their specifications until finally digitizing the modulator using direct digital synthesis (DDS) or programmable FPGA devices, with which distortions below 0.03% and dynamic ranges of up to 80 dB are now achieved. **In other words, digital sound quality .**

Will we need to change the transmitter?

Fortunately, if your transmitter is a good brand and is less than 10 years old, it won't need to be replaced.

Check with the manufacturer to make sure it has distortion less than 0.2% and a noise level less than 70 dBA. This provides sound that is perceived as "digital quality" by almost all listeners.

Even if you don't have a transmitter with this level of quality, you can always opt to replace only the exciter with a digital one. Consult your manufacturer for the recommended model.

Thank you fellow radio owners and technicians for using these technologies to make our FM receivers
be reborn with **FM DIGITAL**

To learn more about our consoles, visit:
www.solidynepro.com/unidex

To view the 542/AoIP processor, please visit our website:
Products >> Audio Processors >> 542apc