Are the transmitters in your network really prepared for IP distribution?

For both Digital TV and Digital Radio, some broadcasters (or network operators) would answer "Yes" without hesitation, some others would choose a "maybe" or an "it depends on the application" yet many of them would simply shrug their shoulders showing a sincere hesitation.

We normally see in the Digital TV industry (DVB-T/T2, ISDB-T/Tb, ATSC, etc...) and in the Digital Radio industry (DAB/DAB+/T-DMB, etc...) many different cases where the network operator or broadcaster thought their transmitters were ready for IP distribution, the reality being totally au contraire. We have also faced many cases where even the requested specifications in tenders in regards to the transmitter IP inputs were not specific enough in order to ensure that the transmitters offered were fully prepared for IP distribution.

Finally, we still meet cases where the network operator did not find a coherent reason to care about it since there was not any content distributed over IP on their network at the present time.

Due to this aura of hesitation experienced around the topic, we have decided to put together this paper to give our point of view about why a Digital TV or Radio transmitter should be fully prepared for IP distribution from the moment of purchase.

The concept of "Fully prepared for IP distribution"

There are many considerations around this concept and some of them technically obvious, for example, that the IP interfaces must support multicast or DHCP mode. However, the intention of these lines is very practical.

We will assume that the specifications regarding the protocol are supported and we will focus on the practical side from the network operator point of view. Therefore, here are some of the topics we would like to highlight as essential for having a fully prepared transmitter for IP distribution:

1. THE CAPACITY OF ALL IP PORTS MUST BE GIGABIT (1000 MBPS).

When a connection is established on a network, there is a trade/negotiation among the IP devices to check what is the maximum capacity supported by every element on that network. Professional routers and switches usually support capacities of 1 Gigabit/sec or even higher. Therefore, the transmitter (modulator) needs to correspond in order not to be the device that limits the capacity of the network.

Normally this is not an issue, and network operators ask for this capacity when they refer to "IP inputs". It is true that few years ago, the maximum capacity offered as IP input on modulators was 100Mb, but today, there are solutions where all the IP ports support one Gigabit capacity. It is also important to recommend, that all IP ports have Gigabit capacity, the reason for this, is clarified in the next point.

2. THERE SHOULD BE ENOUGH IP PORTS TO MANAGE IP INPUTS AND CONTROL.

It is not unusual to see on some requirement specifications the following statement:

"IP inputs: there should be a minimum of 2 IP inputs"… period.

There are solutions that comply with this requirement and at the same time are letting the network operator receive a solution far from being prepared for IP distribution.

We would like to remark on the difference between IP ports or IP interfaces, and IP inputs. It is very important to question oneself the following before requesting a minimum specification:

a.   How many physical IP ports/interfaces do I need in my transmitter now or will I need in the future?

b.   How many of those ports will be dedicated as input for IP content?

The responses to those questions for having fully ready IP transmitters start with the second one:

Response b

> *The normal case of a network where the content is distributed over IP, is that at the input of the transmitter, there are two feeds with the same content; one as main and the second one, as a backup in case the main fails. Therefore, the response to the b) question is two (2).*
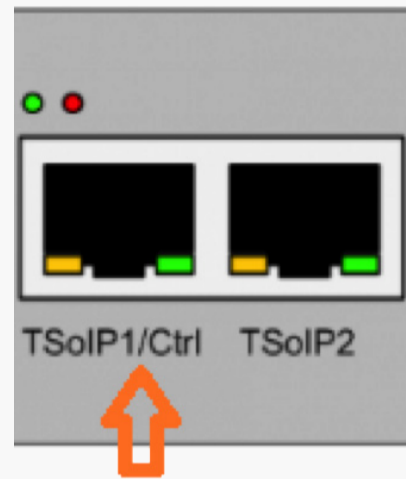
Response a

> *Based on the previous response, I need 2 ports dedicated for IP content input but… what about control/management of the equipment (modulator)?*

A valid response would be:

"I can use one of the IP ports dedicated for input also for control".

This is true; there are solutions in the market like this:

However, this solution raises a critical fact:

◆   If the Physical port falls, you will lose both IP input and communication with the modulator since they share the same interface and physical port. Either some physical/mechanical damage or any logic problem will leave the network operator without input and access to control on this port.

◆   Another point to take into account is that using same connection for IP content and control on a network where some of the network elements such as routers/switches have limited capacity, will most surely result in capacity troubles at the input of the modulator. For example, upon a high priority and high stream at the input, it would not be atypical to experience timeout errors when trying to manage the modulator through the same port.

Another valid response could be:

"I will control the unit through the serial connector (usually RS232)".

This is also true, but…weren't we talking about fully prepared IP networks?

So the better response would be:

"At least three (3) physical IP ports".

This is possible to find in the market today, not only three, but also four since many RJ45 manufacturers produce the Ethernet ports in pairs:
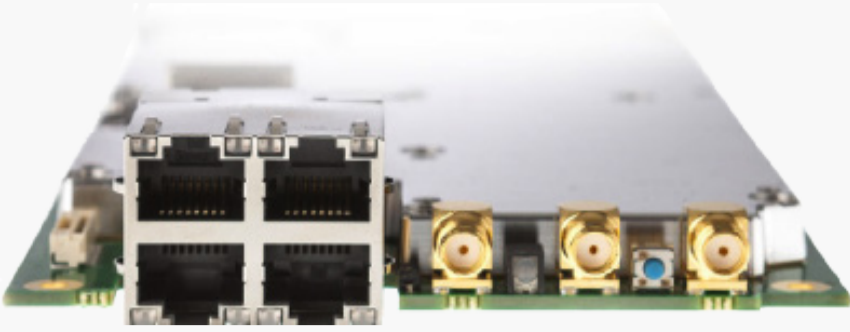
3. EACH PHYSICAL PORT MUST HAVE ITS OWN MAC ADDRESS

If a modulator/transmitter has only one MAC AD-DRESS for all the ports, it does not matter how many ports it has, if the MAC Address falls, all IP connection falls.

In order to ensure full redundancy on a network, the IP inputs to the transmitter need to have independent MAC addresses and same reason is applicable to the control port/s.

Only in this way, the network operator will be ensured with full IP redundancy point to point.

"The content on my network is not distributed over IP…

…therefore, it is not necessary that the transmitters should receive IP content"; a sentence that we it is heard often and it is a very legitimate answer to the same question as the very title of this article *but* only for the present, what about the future?

Remembering that transmitters are sold with a lifetime of 10-15 years… what about if in some years there is a new service distributed over IP to the site? What about if the network infrastructure evolves towards an IP Network? Would it be so naive to think that your network will move towards IP distribution?

Traditionally most TV broadcasting was (and still is) based on the MPEG2 transport stream, but increasingly IP has influence in this domain.

In addition to this, the breakthrough of UHD 4K TV, the motivation for IP based TV networks is a reality. While the HD transition began for many in 1998, it is just wrapping up in some places almost 17 years later. The transition to IP, however should take a lot less time.

It is just a matter of realizing how the TV business is evolving around the world.

There are modulation solutions available in the market, which are fully IP ready without the need of purchasing the IP functionality until it is needed. These solutions are fully IP prepared but the IP inputs are enabled by a SW license (even remotely) if needed after purchasing this option/feature. This solution allows the network operator to have an IP ready transmitter without the need of paying for it at the time of purchase, only when it is needed.

Knowing this, it would be very wise for network operators to ask for this functionality on the modulator at the time of purchase independently if the content is distributed over IP or not at the moment of purchase. Since the alternative to this would be to invest several thousands of euros per transmitter on an IP->ASI converter if needed in the future.

At the end of the story…

Each TV & Radio Network in the world is different. Different topology, different equipment, different content, different quantities, different geography… Nevertheless, there is an unstoppable fact: Content and distribution moves towards IP.

This reason should be enough for all Digital (TV and Radio) network operators to purchase and install transmitters, which are fully IP ready. The key element in a transmitter that allows this is the modulator.

Based on these lines, our humble advice to all network operators, big and small, famous or not, when buying transmitters, to ask which modulators possess and support :

◆ 4 x IP physical ports
◆ At least 4 x IP interfaces with an individual MAC address for each
◆ Gigabit capacity
◆ Possibility to enable two of the IP ports/interfaces as inputs for content by software installation remotely.

Far from trying to educate anyone, this document is written with the aim of sharing some situations experienced when trying to promote in the TV market, an IP future proof modulation solution and hoping that it could be of help to any TV broadcasting professional within the distribution/transmission side.

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