Interworking of Mission Critical Broadband and Current Narrowband Networks

Webinar 15 October 2020

View the webinar recording here.

This document sets out the questions and answers from the webinar.

The diagrams show the IWF co-located with the LMR systems. Are some LTE networks planning to host the IWF on their internal cloud and use LMR wireline interfaces for backhaul from the LMR network to the LTE IWF?

The 3GPP standards would allow it as they do not state that the IWF must be physically located in the non-3GPP system. The reality is it will probably be collocated with the TETRA, GSM-R or P25 system. From the TETRA point of view, we are specifying the interworking function to be part of the TETRA system, and so it will most probably be located together with the TETRA system. In a deployment scenario, the manufacturer could say 'I'll put the interfacing element of this together with the mission critical broadband side and then have some kind of remote link into the core of the TETRA system', but it is not set out in the standards. In terms of FirstNet, which is building one nationwide network in partnership with AT&T which has large operations centers where MCPTT servers etc are, it is likely that they will want to have the IWF in their operations centers since it's a hub and spoke interface with the ISSI. They could then install as many IWFs as they want and interface to LMR systems in different regions of the country from their different operations centers.

(To DSB) Do you have any operational or practical recommendations for your interoperability between countries?

Yes we do, we have worked on a document that has been published by TCCA titled: *Guidance on ISI interoperability issues doc TF20-98-27 v10*. The document found here. Note this is available to TCCA members only.

What about DMR?

DMR is not specifically standardised as an interfacing technology. If there was a big user need out there it should come in through the requirements process in 3GPP.

Is the security gateway within the IWF different than a security gateway that may be between another unprotected MC system?

It is the same functionality. Within the Mission Critical security specification in 3GPP TS 33.180, there is the definition of a security gateway between an MC system with full security and 'something else' which could be an MC system that chooses to run with no security on it, or it could be a different sort of technology. It's the same functionality that we would see within the IWF when it is deployed.

For the deployment scenarios, there isn't an IWF-to-IWF interface to my knowledge. Are there plans to include that, or an alternative means of communication between systems?

There is no need for it. The interworking by its definition is a means to connect one technology to another technology, so if two MC systems needed to be interconnected there are interfaces defined within 3GPP. The connection of different MC systems is called 'interconnect' in 3GPP terms.

(To Erillisverkot): Will you validate IWF with all types of radio you have in your TETRA network? Or if it works for one type of radio, it will work for all radios and software releases, because it is seen for the radios like an ISI…?

We don't have a mission critical broadband system to connect with at the moment, but if we had one connected to Virve via the IWF we would expect the TETRA radios to see the critical broadband system as another TETRA system connected via ISI. For that reason we would do the same testing that we currently do for ISI.

If having the IWF co-located with the LMR systems, it seems necessary that 3GPP IWF-1/2/3 interfaces will be accessible and available to the LMR vendors and LMR network operators?

Absolutely true, they are public domain specifications and available from www.3GPP.org

What are the biggest limitations in TETRA ISI which are considered to be accommodated in IWF?

(DSB) One of the challenges will be the type of migration as you want to have everything not provisioned or configured in advance but there is more space for dynamic situations to solve this. (TCCE) The same is true for interworking with the IWF. Migration itself is not possible as there are two different technologies on either side. However identity translation and need for membership lists that translate between the technologies create the same issues. If I have to populate every individual on the TETRA system that might need to communicate with the 3GPP system in a list with an equivalent 3GPP identity, and do the same in reverse, then that creates lists of users that have to be maintained. That's why there was some discussion in the standardisation process about being able to do this with an algorithm, but it would have to be designed for that system/users.

(To Erillisverkot) In July TCCA announced cooperation with GCF for IOP testing standardisation on upcoming MCPTT and other hybrid terminals. Would it be such that the IWF IOP testing could also be based with GCF?

Yes that could be part of the testing regime. TCCA and GCF are currently focusing on interoperability between the user equipment and the network but we have been talking about testing other interfaces such as IWF as well. Obviously the IWF links different technologies and GCF is mobile focused not LMR so the IWF might be out of scope of what GCF wants to do.

(To FirstNet) How would the information be passed between IWFs, particularly for key changes?

There is no IWF-IWF interface. Configuration in general is a complex topic as, for example, in TIA-102, P25 there is no standardised group management function so you could not connect a 3GPP group management server to a P25 group management server and exchange information. There is an IKI (inter-KMF interface) in P25 so you could potentially pass keys to another system but that would require you to put the equivalent of a key manager over on the 3GPP side that talks the P25 language. There have also been some concerns expressed about the need for an IWF-IWF interface for redundancy solutions, but those kind of redundancy/reliability solutions are outside the scope of the standard.

For the IWF GW, as there are many variants on the LMR/TETRA/P25 side, it looks like the implementation has to be per variant, very costly. Is there any standardization effort on the IWF GW implementation?

Part of the reason for standardizing the LMR side of the IWF is that so there is a uniform way to connect into the critical broadband systems, so for example North America is going to specify the use of the ISSI. There are lots of different systems out there and this touches a little bit on the DMR question, because North America has P25 Phase 1 and 2 and those are both covered by the ISSI. However, there are other systems out there in use – TETRA, EDACS, OpenSky, ASTRO etc., so providing an interface into those systems is possible, but the system vendor on the LMR side is going to have to develop an ISSI interface and use that to connect into the IWF and do the translations at their ISSI gateway in their LMR system. There are implementations out there that already do that. Note that the TETRA standard solution is to use the 3GPP specified IWF interfaces as the TETRA interface.

When will IWF practically be available for TETRA? Will this depend on the willingness of my TETRA supplier? When is the earliest year that this could be expected?

Yes, it will depend on your TETRA supplier to implement the 3GPP interface. In terms of when, functionality is usually available around 18 months to two years after a standard is complete. The ETSI standard for the TETRA IWF is expected to be ready in 2021. The issue that we have in the TETRA standards body is that we have a very small number of participants and contributors, and that is why we are putting the date for completion of the standard back to later next year. If there are other members of the TETRA community who have the knowledge and willingness to get involved in this, you would be welcomed into TCCE Working Group 4 to try and make the standard available more quickly.

Do you expect widespread IWF adoption or there will be a fair amount of LMR GWs adopting MCPTT-x client interfaces (e.g. current RoIP GW or control room suppliers)?

It's an interesting idea and lots of people are taking about things like this, and it is likely there will be some client interfacing out there. One topic that comes up a lot is the Control Room interface, the Dispatch Center. The IWF was not designed to support a console interface, it's a system to system interface. So if you have a Dispatch Center, you route it through your LMR system into whatever interface it is that goes into the 3GPP side. But how do you avoid throwing away your Dispatch Center, and how do you develop MCPTT broadband consoles? It's designed around the client interface so it's expected that people will already have seen some gateway interworking products and prototypes out there that have implemented client interfaces in a box and they talk into the

LMR system on the other side. All sorts of creative solutions will come out, and as long as ultimately it talks via some standard somewhere, it will be able to communicate. It gets down to what features need to be supported – if it's just audio between systems then RoIP is a great solution, but sometimes you don't get IDs, you don't get emergency alerts, so it depends what problem you are trying to solve and what functionality you need.

Under TCCA there is a global working group which is looking at how to connect Control Rooms to 3GPP systems and which interface is best to use (it is intended to be the 3GPP client interface), and they are currently looking at the deployment of that in control room situations and deciding if there are any gaps that may need standards extensions.

Could you explain the reason for IWF to support different connectivity model to MCS (like participating to controlling, controlling to non-controlling, controlling to participating) and what do you believe will be the preferred scheme?

The controlling and participating are two roles that an MCPTT server can take as needed. The controlling role is in charge of the call so, for example, in a group call, carrying out the call processing for the group, deciding who gets to talk next, retransmitting the speech and so on are parts of that role. The participating server is looking after its users. In terms of the IWF, it's exactly the same. So the IWF/LMR system on one side would take the controlling role if it's an LMR group (homed in the LMR system). So for that example the TETRA system is the controlling entity for that group across the IWF to the MCPTT server who is the participating entity and is looking after the MCPTT users. The same happens in reverse if the call is being managed by the MCPTT system (group homed in the MCPTT system).

Is there scope to extend the IWF for other connectivity types such as satellite PTT solutions?

Any other technology could be considered by 3GPP. It would need requirements to be brought to the requirements group, SA1, and inserted into a Technical Specification. The stage 2 and stage 3 groups could then work on the requirements in such a TS. Note that satellite solutions will have higher latency (communications delay) than terrestrial systems, and therefore performance requirements would need to be specified as part of any requirements capture.

We understand that ISI has two specifications – E1 and IP interface. Which one is considered for the IWF?

The IWF uses protocols built on IP technology, e.g. SIP, HTTP, RTP. It would therefore only be possible as an IP based solution.

GSM-R is a system manufactured by very few manufacturers now. Can you give details on roadmap for IWF with GSM-R? Does the IWF also consider rail specific functionality such as location-based calling?

Interworking with GSM-R is part of the 3GPP Rel-17 feature set. Stage 2 is complete; stage 3 is ongoing. Location based calling is not part of the current work in progress. The other part of the IWF

for GSM-R will be done by ETSI in its Technical Committee RT, which has recently started with a study item for GSM-R IWF.

What are, if any, the tangible limitations in adopting a non 3GPP compliant internetworking solution, that many smaller (largely homegrown) companies are offering to meet the immediate needs to integrate Legacy (not obsolete) and Broadband PTT networks?

As the interworking specifications are not yet complete, proprietary solutions are the only way to provide some sort of interworking functionality at the moment. The limitations of those solutions will be vendor specific and are likely to depend on the level of access that the interworking solution has to the LMR system and the PTT solution, and the level of control functions available on each. Depending on the time that the interworking solution will be in place, its upgradability to a standards compliant solution could be a factor in deciding on such a solution.

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