

Request for information

Virve 2.0 mission critical services Summary of responses

v1.0 (22.04.2020)

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Introduction

Erillisverkot published a Request for Information (RFI) on Virve 2.0 mission critical services in November 2019.¹ Our primary goal was to get a good picture of the maturity and interoperability of these solutions to guide us in shaping our related procurement strategy.

We were pleased to receive in total 30 responses from various interested parties from all over the world and from many sides of the industry including, for example, suppliers, consultants and other public safety operators. Several of the responses focused on only some areas of the RFI based on their own interests and capabilities.

This document is a summary of our findings based on received responses and related follow-up discussions. We assume it provides a pretty accurate picture of the current situation and near future plans of the 3GPP-based mission critical services industry at the moment. However, we expect to see fast evolution in this market and anyone conducting a similar exercise in the future is likely to receive different results.

The document is organised in the same manner as the original RFI, focusing first on the mission critical services before moving onto other applications, usability, interoperability, testing and other related issues. Where words like “all”, “many”, “some” etc. are used, these refer to answers received i.e. excluding responses without respective answers.

What we learned has a great influence on deciding what we will do next. However, there are several other factors to consider as well and for that reason our next steps may not fully align with the findings in this document.

We are very grateful for all of the responses we received and hope this summary will be of interest to similar projects in other countries.

¹ https://www.erillisverkot.fi/files/328/Virve_2_mission_critical_services_RFI.pdf

1. Mission critical services

3GPP publishes its specifications in Releases, a new one being published every one to two years. We suggested that mission critical services functionality included in 3GPP Release 15 would be a good starting point supporting many of the necessary mission critical functions and therefore providing a good platform to begin with. Everyone agreed with this assumption. Earlier releases would be more challenging to work with as they lack important functionality and upgrading from those to Release 15 and beyond would be more problematic than upgrades between later Releases.

However, about one in three pointed out that Release 16 will introduce a few necessary additional functions such as interworking with legacy systems and patching of groups. For that reason they suggested we should either consider Release 16 as a starting point or evolve our solution to Release 16 relatively soon after rolling out our initial offering.

1.1. Servers and network connections

We had several questions related to the possibility of splitting the server functionality along the functional lines defined in the 3GPP specifications. We asked e.g. about purchasing application servers from different suppliers and whether the management servers should come from the same source or be purchased separately.

The answers were split between three almost equally sized groups:

- those supporting the idea of multiple suppliers,
- those who believed all servers should come from the same vendor, and
- those who stated most of these should come from the same vendor excluding potentially the identity management and key management servers.

The main reason given by the majority for purchasing the server side from one source was the fact that the technology is still very new and for that reason interoperability is still in its infancy, not made any easier by the fact that some interfaces have not yet been specified fully.

Considering the interworking between the TETRA-based Virve service and the future 3GPP-based Virve 2.0 service, slightly more than half suggested only using the interworking function (IWF) specified by 3GPP and ETSI while recognising the fact that it has not been fully defined yet. The rest were either in favour of or stated as an alternative other technical options. Overall, the message from the industry was still pretty clear - if reasonably possible, go for an IWF-based solution.

1.2. Clients

Many were of the opinion that the market is not yet ready for true interoperability between mission critical servers and clients, suggesting using only the client of the selected server vendor. Some even suggested that if multiple clients are required the best way forward would be to each time purchase a matching set of servers.

Our take on this was that despite the good progress witnessed at the MCX Plugtests events the client-server interoperability today seemed to be questionable. There seemed to be slightly more trust on the interoperability of server-server interconnections.

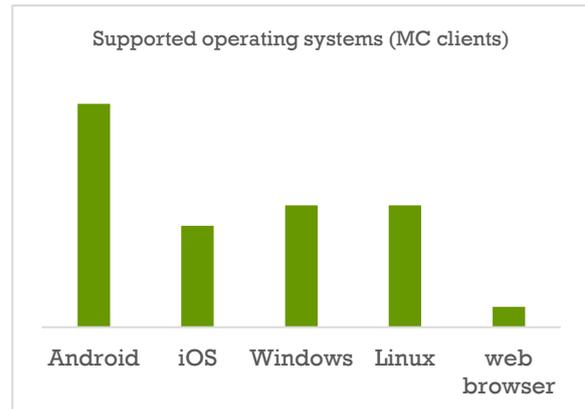
Supporting a similar line of thought, one easily adaptable or even self-adapting client on the end user devices was seen as the best way forward for now. Trying to solve the challenge of different device types by purchasing the best client for each device type was thought to be an interesting but not workable idea at this stage. The same applied to our question about using several clients on one device – one multifunctional client per device was the normal recommendation.

For the longer term, there was more belief in achieving true server-client interoperability between multiple vendors.

We also asked about operating systems.

All of those providing MC clients for mobile devices supported the Android platform. Out of the two major mobile operating systems Android was the one seen as suitable for mission critical use. iOS solutions were often stated to be only suitable for business critical use.

Many of the companies who responded had a dispatcher client and/or an interface for integration of a third party control room system.



Views on the need to optimise the client and/or the device varied slightly.

About half stated that integration effort will be required in order to meet the relevant key performance indicators (KPIs), many of those expecting both the device and the client needing modifications to achieve these targets. This was followed by about a quarter who thought this should not be needed or was not a major issue, with the remaining companies thinking integration work might sometimes be required.

It was slight more common to suggest the client will need modifications than that a device would need modification or other fine tuning.

1.3. Middleware

Middleware in the end user device providing a harmonised API to the application layer was seen as a theoretically interesting and useful idea. However, it was normally pointed out that there are several potential problems with such an approach, e.g. including another piece into the overall solution that might fail, needs testing and updating, may hold back introduction of new features and could even potentially prevent needed upgrades.

It was also pointed out that any use of middleware might be problematic if the project or company in charge of implementing the middleware happened to run out of money or support leading to development & maintenance stopping there.

Middleware on a low level, close to the HW of the device, was seen by some as potentially more useful idea, although with many of the same caveats including the development project running out of steam and the middleware functionality development stopping there.

Some proposals were made on how to avoid the highlighted problems if we went down the middleware route. The selected middleware solution should be based on open source and specifications to avoid reliance on a single supplier. It would also help if there was some sort of an

international steering body guiding the development that included mission critical end users and/or operators to ensure the middleware implementation(s) will meet relevant needs now and in the future.

As an alternative API, many client vendors either offered or were at least open to the idea of providing an API from their client to other client applications, e.g. to enable a mapping solution to offer one-touch calls to anyone shown on the map.

2. Other applications

Our plans have developed since the publication of the RFI and it was good to see how well the responses in this section matched our current plans. We are going to implement a two-part test environment; a test network more aimed for testing prototypes and a pre-production network for testing finalised products or upgrades in an environment similar to the live Virve 2.0 network.

We see it important to support remote testing as that will help us to manage the demand and it will also lower the cost of testing for all parties. However, not everything can be tested remotely so testing in the lab and over remote connections will both be supported. Testing out in the field using the live Virve 2.0 service will not be permitted.

In general, this kind of approach was seen to be good. Where the responses varied slightly was mostly to do with how much the suppliers should pay for the testing or should it even be free of charge.

3. Usability

We are keen to ensure that our future mission critical service does not just technically meet the mark but is something our end users will find usable as well. For this reason, we asked about how to include usability aspects in our procurement process.

This was seen as a good but challenging question. While some supported the idea of providing use cases or describing what the user should be able to do, the majority thought we should avoid going into much detail on this area as that might easily prevent innovation and result in sub-optimal implementations.

Instead, the existing mobile operating system design guidelines² were often mentioned as something we could refer to.

4. Interoperability, certificates and testing

We are happy to see that the GCF/TCCA task force on interoperability testing is now working on many of the topics we asked about under this heading.

However, we had one area in mind that this task force will not address; how to do automated and often repeated testing at our lab. While in theory we could use third party UI testing tools that basically record and repeat user actions, we were keen to find out if the MC clients had an API or

² Android: <https://developer.android.com/design>, iOS: <https://developer.apple.com/design/>

similar interface to the client application available to enable us to implement automated tests that are more manageable.

The answers split evenly into three groups:

- those who already had a (proprietary) API that possibly could be used for this purpose,
- those who were working on such an API or at least considering implementing it, and
- those who suggested other ways to test, e.g. using third party UI testing tools.

5. Server installations

The last major set of questions focused on the server architecture and specifically on SW virtualisation.

All parties stated that virtualised mission critical servers were feasible and saw this as the direction to go for. However, several pointed out that to achieve the required levels of performance and security separate HW may be required. This may result in sub-optimal use of the available computing platform but is clearly something that needs to be considered.

Related technologies such as containerisation, auto scaling, self-healing and operational automation were either supported to some degree or on the roadmap for many but not all of the companies responding to these questions. We believe it will take a few more years before the MC industry fully catches up with the modern ways to build cloud-native solutions.

6. Summary

The mission critical services technology as defined by the 3GPP is clearly in the beginning of its life. It shows great promise but does not yet seem to fulfil the underlying promise of interoperability between different implementations.

The lack of true interoperability today is something which hopefully will be solved by the ongoing international work supported by organisations such as ETSI, TCCA and GCF. However, it should be pointed out that no international testing framework will remove the need for us to test solutions aimed to be used in our network.

In addition to the interfaces between mobile clients and the MC servers people often first think about, the other 3GPP-specified interfaces from the MC servers towards other networks (both 3GPP and non-3GPP) are also very important. It was good to learn that support for those exist, even if not necessarily yet always on an interoperable level.

We were slightly disappointed to hear how little interoperability there exists between the different types of application and management servers today. We hope this will improve over time and any specifications that may be lacking in this area will be included in the future 3GPP Releases.

SW virtualisation and the move to the cloud are IT trends the mission critical communications cannot avoid. Fully benefiting from new technologies such as 5G and AI will drive us there. It is promising to see that the move from the more old-style design approach towards modern design and implementation principles has started.

We hope the report has been of interest. During this process we have learned a lot of the current state of the technology but want to remind the reader that this is a quickly evolving field. We expect the findings in this paper to be soon out of date.

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