



# SIM Card White Paper

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# Executive Summary



This paper has been written to explain why the SIM cards utilised by FA in our Lima Cell Monitor solution are reliable, fit for purpose and enhance the experience of an RF Surveyor.

There is an on-going debate in relation to the reliability and trust that can be placed in the SIM cards that FA supplies by default with a Lima Cell Monitor. We settled on this solution in order to create a level of flexibility and operational efficiency hitherto unseen by RFPS surveyors.

We therefore wish to explain why the SIM cards that we supply with Lima Cell Monitor are extremely reliable to ameliorate any concerns, fear, uncertainty or doubt and to instil confidence in the RF Community.

Service Providers have two business objectives - 1 - Increase ARPU (Average Revenue Per User) and 2 - Increase ARR (Average Recurring Revenue) - this is good for business. To achieve this they concentrate on the business community and the high consumers of services and bandwidth. PAYG services are valuable to a CSP but they are often temporary by nature, utilised by users for whom credit worthiness may not be a consideration and they represent unpredictable revenues for service providers. When a new service is launched (like SA 5G) CSPs have no wish to instantly flood the network and focus on the high ARPU consumers. This is evidenced by the fact that VOLTE had been available for a few years before PAYG customers were allowed to use those services.

Having Contract SIMs may therefore be a prerequisite for undertaking dedicated mode surveys which given the dynamism of the RF environment may be a critical part of an 5G SA RFPS survey of the future.

Whilst it's possible that 'roaming' SIMs could be handled and prioritised differently than 'national' SIMs, it's equally possible for roaming agreements to specify that roaming SIMs are treated the same as national SIMs - it's good to have the reassurance that the SIMs used in our Lima product are contractually obliged to behave like national SIMs, meaning that our users can stop worrying about that and get on with simple, trouble-free surveying.

Trust in RF surveying equipment has to be absolute especially when the acid test is the scrutiny that it may be subjected to at court.

Lima Cell Monitor is used on a daily basis up and down the land collecting data which is reliable and trustworthy to an evidential standard. We are supremely confident in the value that the Lima Cell Monitor solution has added to all the forces who have procured thus far.

We selected these SIMs for the obvious operational benefits they give to the RF Surveyor and would not have done so were this to result in inhibiting their activity in any way or impacting the reliability or veracity of their survey data upon which they rely.

# SIM-based Surveys



There are currently two options for undertaking RF Surveys – Scanners and SIM Based solutions. SIM based solutions are either actual phones with special applications on them or Modem based solutions which emulate them.

As a general rule, Scanner based solutions tend to be very expensive, produce huge swathes of data and require interpretation. In addition, they can be more difficult to explain to a jury.

SIM based devices are either mobile phones or they behave as mobile phones. This means that they essentially have two fundamental components – a radio transmitter/receiver and a SIM card.

The radio transmitter tunes in to the various radio channels broadcast by the cells providing service to the local area. A SIM card contains some key identifiers which are required when a handset attaches to a cellular network and attempts to undertake transactions over that network.

SIM cards that are used by one country and used in another can be called Foreign or Roaming SIMs. SIM cards purchased to be used all over the world are called International SIMs.

One of the key functions of the SIM card is to steer mobile device and survey equipment towards the desired network and also to inhibit connectivity with the other national networks.

The challenge associated with that is that in order to have the option to connect to all networks we need multiple SIMs and multiple radio interfaces so SIM management can be challenging.

At FA we have come up with an innovative solution which removes the requirement for SIM management. We supply contract programmable SIMs which allow an RF Surveyor the ability to change network provider on the fly. This means that we can supply a solution with fewer moving parts which enhances the reliability and longevity of RF survey equipment and which results in operational efficiency gains which our users have found really valuable, and which has transformed their RF Surveying experience.

# SIM-based Surveys contd.



There is seemingly an on-going debate in RF circles around which type of SIM card to use for RFPS surveying and whether there are any key considerations, issues or technical impediments associated with particular types of SIM cards.

A mobile device is capable of undertaking a voice call across a cellular network in the absence of a SIM card when the emergency number is dialled – from an RF point of view this proves that a mobile handset, irrespective of which network the SIM constrains it to has the ability of to see all the national cellular networks and all the radio channels broadcast by all Cell Sites in an area by default and independently of the SIM card itself – in the same way that an RF Scanner can.

When a handset is away from the home network and in a different country the principles of network attachment don't change and neither do the nature of the available radio channels.

Mobile service providers have the ability to control what kind of services or what radio channels a mobile device can get access to. They will do that as a function of the type of service that the subscriber has purchased.

An example of this was that until June 2021, Pay As You Go SIM cards were not allowed access to VOLTE based radio channels. Our SIM cards are supplied by Tele2 – a Swedish based global telecommunication service provider.

We have consulted with them directly for confirmation that their SIM cards will be treated no differently to other national contract SIM cards.

We received the following confirmation from Fredrik N Nilsson, Manager, Roaming Operations, Tele2 Group.

“This letter is to confirm that the roaming coverage of Tele2 Sverige AB does not differ from the local mobile network owners. Our roaming agreements states clearly that there are no prioritization between local and roaming subscriptions.”

This is entirely consistent with our own internal testing in which we packed two Lima Cell Monitors with PAYG SIM cards and two Lima Cell Monitors with Tele2 SIM cards. We found that after factoring in the natural variances that pre-exist within a dynamic RF environment the results of the surveys were comparable.



# SIM-based Surveys contd.



Interestingly the RF community have been undertaking RF Surveys with PAYG SIMs for years. The issue of whether a suspects handset used a contract or PAYG SIM never arose. This was never a consideration and if the concerns that service providers treat different types of SIMs very differently there is an argument for revisiting all those RF Surveys from the hundreds and hundreds of cases which have successfully gone through the court system and re-examining which handsets were contract and which were PAYG. It has never been a consideration it is our contention that it still isn't – a Tele2 SIM will be treated exactly as it would another contract UK SIM.

The word “may” features in the above paragraph. The reason for this is that a fundamental and key function of a mobile service provider is to generate “shareholder value”. They are a business and their desire for profit drives the technical decisions that they make. Just because a CSP (Cellular Service Provider) has the ability to differentiate services through a myriad of metrics it doesn't mean that they will. CSPs are fundamentally in the electronic plumbing business, connectivity – they are focussed on getting as many simultaneous connections across their networks as possible as this will generate the maximum revenue leading to significant profitability. Roaming SIMs are very attractive to a service provider as they can generate high levels of profitability for the service provider and so any network configuration to delimit this type of traffic is highly unlikely.

The reason for writing this brief paper is because there seems to some level of concern from some in the RF community that to use “Roaming SIMs” within our Lima Cell Monitor solution may produce different results from national SIMs. This is not consistent with our experience or the experience of our surveyors who have been actively using Lima operationally for over a year now. We are very keen to address this issue head on so that any fear, uncertainty and doubt can be addressed and dispelled.

This issue is something that we did a lot of work on before selecting our UK based SIM service provider when we were developing the Lima Cell Monitor solution for UK law enforcement. Once a modem has attached to a particular network it will be treated by the network as just another contract SIM card.

In the SOPs it does mention that the best practice would be not to use Roaming SIMs in RFPS equipment. This statement is true if you were to simply place a foreign SIM card into a mobile based survey device – as there is the risk that the handset could jump from network to network in line with changes in the RF environment.

The SIM cards in Lima Cell Monitor however, are locked to a particular service provider which means that they stop behaving like roaming SIMs and instead behave like a contract SIM card on the selected network so random network swapping cannot happen. The benefit to a user is ease of use, flexibility and fewer moving parts to go wrong allowing you to swap between networks as you wish and on the fly.

# UK Summary



Our SIM provider supplies their SIMs to businesses big and small and on a global basis. One of their UK customers has an installed base of 11,000 SIMs. There are no issues with these SIMs and the modest estate that we have supplied thus far are no exception.

The Lima Cell Monitor solution itself has been in operation for over 7 years and has earned its spurs in mainland Europe over this time and in the UK proactively for at least a year and a half. The Met Police retired C-SURV at this time last year in order to pursue a strategy for RFPS surveys which has Lima Cell Monitor at its very heart as a workhorse surveying tool.

The Lima Cell Monitor solution SIM cards have been collecting evidential data in the UK since being commissioned into service over a year ago and Lima Cell Monitor data has formed the very core of many investigations and intelligence gathering activity.

We regularly communicate with our user base and discuss the experience of the RF Surveyors. The experience of our user base is universally positive in terms of the ease of use, the reliability of their surveys, the increased volume of RF Surveys undertaken due how easy this is and their satisfaction that Lima Cell Monitor does what it says on the tin and has a development roadmap of features which can be automatically uploaded remotely and at a time of their choosing.

The RF team at Forensic Analytics are totally dedicated to supplying what we believe to be the best RF solution, the best training and the best support available in the market today for the only solution which has been and continues to be developed specifically for LEA as a stand-alone multi-SIM solution.

# Conclusion



The Lima Cell Monitor solution is an innovative, low risk acquisition which will give years of trouble free, reliable, evidential surveying which enjoys the best support of a dedicated team possible.

This is the only RF Solution in the market which has been built from the ground up to be a modular and industrial scale RF stalwart, capable of supporting RFPS technicians for years to come. The solution is proven with over a year and a half in the field and has been validated throughout the UK. There are very many practitioners out there whose RF Surveying has been transformed in a positive way beyond all recognition.

We have a long list of referees who will attest to this and will lend their endorsement this excellent and elegant RF solution.