

Final document
Variant of [98e-03-DevCompliance] Version 0.0.5
RAN

<https://nwm-trial.etsi.org/#/documents/8397>

3GPP TSG RAN meeting #98e RP-223443

Electronic Meeting, December 12-16, 2022

Source: Nan Hu, RAN VC(Moderator)

Title: [98e-03-DevCompliance]

Agenda Item: 6.1

Document for: Discussion and Decision

1 Introduction

This is the kick-off of the following email discussion

Table 1:

Email Thread Title	Related Documents	Docu-	Moderator	Agenda	Use of NWM?
[98e-03-DevCompliance]	RP-223071		Nan Hu, RAN VC	6.1	yes

2 Background

Conclusion from RP#97e:

RP-222163 is noted in chair notes and the related discussion can be continued and driven by contributions with more details of solutions.

The following background and proposals are provided in RP-223071:

Background

Observation 1:

As indicated in [1], a general solution is expected by operators to identify the non-3GPP-compliant devices

unknown to the network.

As indicated in [2], as for the non-3GPP-compliant devices need to be rejected or allowed, this is preferred to be operator depended. Operators can reject the non-3GPP-compliant devices, and also may allow the non-3GPP-compliant devices.

As proposed in [2], [1] is noted in chair notes and the related discussion can be continued and driven by contributions with more details of solutions.

Observation 2:

As company indicated in [2], the devices which originated this issue are not certified and cannot be certified and are unknown to the network. To identify the non-certified devices can help to resolve this issue.

As company suggested in [2], the proponents should co-ordinate with the testing/conformance/regulatory authorities in terms of understanding the device’s abilities.

Proposal 1:

3GPP to work out a solution to identify the non-3GPP-compliant devices for the interested bodies. The potential solution should focus on how to identify the non-3GPP-compliant devices, but not on whether operator should reject or allow the non-3GPP-compliant devices.

Proposal 2:

3GPP to co-operate with certification bodies (e.g. GCF) to work out a solution to enable networks to identify the non-certified devices or non-3GPP-compliant devices.

The potential solution could be network to send UE certification reference number to the certification bodies (e.g. GCF) certification bodies to authenticate whether the UE has passed the certification and send success/failure results to network. The procedures above can be implemented after or before UE registration completed.

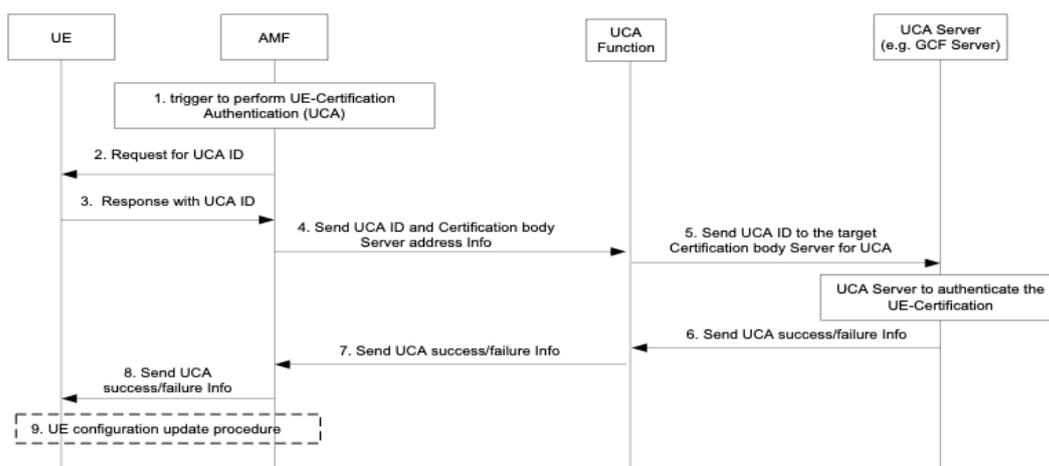


Figure 1:

UCA: UE-Certification Authentication

UCA ID: UE-Certification Authentication ID, the index for the certification activities in certification body,

e.g. REF in GCF

UCA Server: UE-Certification Authentication Server (e.g. GCF Server), used to store the certification information

UCA Function: UE-Certification Authentication Function Unit, to help to route to the target UCA Server

Proposal 3:

RP to send LS to SA2/SA3 to evaluate the feasibility of Proposal 2.

Preference:

[1] RP-222163 On device compliance to 3GPP specifications; Telecom Italia, Telefonica, Orange, Bouygues Telecom; RAN#97e September 12-16, 2022.

[2] RP-222562 [97e-02-DevCompliance]; RAN#97e September 12-16, 2022.

3 Discussion

3.1 Initial round discussion

For further understanding issue:

Feedback Form 1: Question 1: Do companies think the solution provided in Proposal 2 can help to identify the non-3GPP-compliant UEs?

1 – MediaTek Inc.

It is difficult to assess in RAN an example proposal that falls outside RAN expertise. It is difficult to state whether this solution can help. There may be trust issues relying on an ID provided by the UE itself as it could be an impersonated ID.

2 – Apple Hungary Kft.

We think it is first necessary to clarify that both [1] and [2] in RAN#97 were noted, and there is no common standing on observation 1, 2 and proposal 1 mentioned here.

Regarding Q1: Honestly we think we should put a stop to this parody in RAN. We think “everyone” in 3GPP is clear that “3GPP is a standardization body”, and then there are regulatory bodies that use the output of our standards to “enforce and regulate”. Can we stop wasting our time discussing on what 3GPP can help with? 3GPP IS NOT IN THE BUSINESS OF ENFORCING. We should NOT step on the toes of regulatory bodies.

We already mentioned this before: if some operators are not happy with UEs not complying with 3GPP specifications, then they should consult with regulatory/conformance certification authorities.. Bringing in contributions to 3GPP, and 3GPP discussing this, will not help to address operators’ concern since this is

obviously out of 3GPP scope!!

Let's understand this and make this type of discussion be the last in 3GPP RAN!

3 – TELECOM ITALIA S.p.A.

I am confused by the comment from Apple. 3GPP RAN5 has the scope to define conformance testing to verify that devices are compliant to 3GPP specifications (and RAN4 has the same scope for base stations). Therefore, it is in the scope of 3GPP to ensure that testing can be performed.

Stated that, it is also in the scope of 3GPP to specify solutions to identify equipment that could be harmful to operations.

Clearly we support the proposal. The problem could be how to manage devices which not submitted to certification bodies (e.g., GCF).

4 – Beijing Xiaomi Mobile Software

We agree with MediaTek that it outside of RAN expertise.

5 – China Mobile Com. Corporation

CMCC feels quite surprised and disappointed to hear Apple call all these valuable efforts as “parody”. As the victims, operators suffered a lot from receiving the customers’ complaints about the poor experiences, and are trying the best to find solutions to fix the issue, to prevent recurrence of similar incidents in the future. So let's understand the importance of this and put our efforts on how to resolve this problem rather avoiding the issue.

The proposal 2 says nothing about “enforcing”. It is just trying to provide a solution for interested operators. Thanks for Apple's comments, and the inspiration just comes from that. We do agree “regulatory/conformance certification authorities” should be “consulted” with. So we propose operators/networks to “consult” with “regulatory/conformance certification authorities” before/after UE registration completed. Operators need to be aware of the non-3gpp-compliance risks before receiving complaints from customers.

As for how to handle the non-3gpp-compliance UEs, it should be pending on operators' preferences and out of scope of 3GPP.

6 – China Mobile Com. Corporation

CMCC totally agrees with Telecom Italia that this is obviously in the scope of 3GPP to specify solutions to identify equipment that could be harmful to operations. Besides, 3GPP is also one of the victims considering 3GPP's reputation has been poorly damaged by this. It is always proper for victims to figure out how to save themselves!

For the devices not submitted to certification bodies, the most important thing is to identify them first. “Non-certified” is already an issue deserves attention from operators. Operators need the “heads-up” on the risks.

And then operators may have several potential follow-up solutions to take, pending on operators' preferences.

- 1) operators can focus on them and be better prepared in case there may be customers' complaints pouring in.
- 2) further offline check with them to know the reason why they are not certified and identify whether there are any problems with these un-certified UEs.
- 3) if only certified UEs are allowed in the network, just reject them.

Please be kindly noted, the “certification bodies” here is a broad concept, even operators’ own “certification” can be in the scope. So I’m not sure whether there could be UEs do not have any “certifications” at all...

We would like to hear more inputs on this. Really appreciated :)

7 – China Mobile Com. Corporation

Thanks MTK for the good point “impersonated ID” here. This is one of the reasons to involve SA2/SA3 in Proposal 3. We need their suggestions on this. Maybe we should involve IMEI in the process also.

Besides, as you may know, operators have privilege in certification bodies to access the certification results of all the certified UEs. So even if the UE can provide “impersonated ID” to fool the AMF to believe it has “passed” the certification, operators still can easily expose the lie when the fake UEs behave differently from the certified results :)

8 – Nokia Corporation

We agree with Mediatek that this is not within RAN’s expertise area and therefore, RAN cannot really assess this question.

9 – Qualcomm CDMA Technologies

We acknowledge the importance for operators and network vendors to know about the presence of non-3GPP compliant UEs in their networks and we are willing to work on solutions to address the concern. We also believe in the value of RAN5 testing and corresponding GCF certification.

As far as we understand, there is already a *manual* process enabling operators to query about the status of certification for a given UE.

There are certain aspects of the discussed proposals which may not scale well with the current certification process (e.g., when is the UE REF ID assigned, what happens after UE SW upgrades, how are exceptions managed, etc.). Those require a better understanding in order to devise a way to achieve the sought objective while not disrupting the ongoing certification processes.

A good starting point could be to devise an automated way (e.g., signaling based) for the network to query if the UE has been certified or not. After we have that in place, we could discuss whether we go any deeper in terms of granularity of the certification, etc.

10 – ZTE Corporation

We acknowledge the operators’ interest in exploring a solution for the problem. We think 3GPP can, if deemed necessary, specify solutions to provide the transport mechanism for conveying the necessary information between the network and the UE for enabling the verification of conformance to the specifications.

We also acknowledge that there could be issues with impersonation/falsification of the information (as already pointed out above) and hence involvement from appropriate SA groups would be needed to develop a reliable solution. So, we support initiating some work on this via an LS to SA groups as proposed.

11 – VODAFONE Group Plc

We agree with Mediatek, that proposed solution is outside of RAN scope. At the same time we share the view from Telecom Italia that it is in scope of 3gpp to develop such solutions if required.

12 – Intel Corporation (UK) Ltd

Thank you for providing the contribution into this meeting. Based on this contribution we have a much better understanding of what co-sourcing companies would like to achieve. Essentially, we understand that the desire is to have a trustworthy and reliable method for the network to know whether a UE has passed certification by the relevant certification body (e.g. GCF, PTCRB, etc).

Regarding the specific proposal of using the certificate reference number carried over NAS as a means of identifying compliant and non-compliant devices, we believe that this may not be completely trustworthy. It is possible that a non-compliant and non-certified UE could provide the reference number of a certified UE in order to gain access to the network. In this case, the network would be unable to detect the non-compliant device and it would be granted access to the network. This potential weakness could be addressed by implementing additional security measures and procedures to verify the authenticity of the reference number and the device itself. This would require greater analysis from people with suitable security expertise (i.e. SA3).

13 – HuaWei Technologies Co.

We understand the intention of this proposal, and are open to discuss how to solve similar problems in the future. However it might be a bit too early to justify whether the proposal is helpful. It would be good to first understand how GCF and other certification bodies select the test cases and provide the corresponding certification. If not all the important cases, typically for mandatory features, are required to be tested in these bodies, the issue of non-compliant devices would still exist even with this solution. So we suggest to first check whether existing certification bodies has done a complete testing.

Feedback Form 2: Question2: If the answer of Q1 is yes, do you agree to progress the details of the solution in proposal 2? And which group is proper to handle this?

1 – MediaTek Inc.

The proposal is not for RAN to evaluate as it falls clearly into SA2 domain of expertise. Company contributions to SA2 would be the normal course of action.

2 – MediaTek Inc.

(and SA3 domain of expertise)

3 – Apple Hungary Kft.

As mentioned above to Q1, none of this is the business of 3GPP.

4 – TELECOM ITALIA S.p.A.

support. And to Mediatek: it would be better to send an LS to SA2/SA3 to raise the issue and ask for their support

<p>5 – Beijing Xiaomi Mobile Software</p> <p>SA2/SA3</p>
<p>6 – China Mobile Com. Corporation</p> <p>Agree with Telecom Italia. To Mediatek: The critical features defined in RAN have been violated. Since you also share the opinion that SA2 may help RAN on this issue, it is justified for RP to send LS to SA2 to raise the issue and ask for their support.</p>
<p>7 – Qualcomm CDMA Technologies</p> <p>Before getting into the 3GPP side of the solution, we believe that establishing a communication with GCF Steering Group (SG) would be in order to better understand what could be done and what not.</p>
<p>8 – ZTE Corporation</p> <p>We are supportive of initiating the necessary work via an LS to appropriate groups (SA2/SA3 for instance).</p>
<p>9 – HuaWei Technologies Co.</p> <p>We understand the intention of this proposal, and are open to discuss how to solve similar problems in the future. However it might be a bit early to justify whether the proposal is helpful. It would be good to first understand how GCF and other certification bodies select the test cases and provide the corresponding certification. If not all the important cases, typically for mandatory features, are required to be tested in these bodies, the issue of non-compliant devices would still exist even with this solution. So we suggest to first check whether existing certification bodies has done a complete testing.</p>
<p>10 – HuaWei Technologies Co.</p> <p>As said above, we think it would be good to first check the existing way of testing for the certification bodies and find out the root cause which allows non-compliant devices to pass the certification.</p>
<p>11 – Intel Corporation (UK) Ltd</p> <p>SA3 would be the proper group to analyse the trustworthiness of solutions for the network to determine whether a UE has passed certification by the relevant certification body (e.g. GCF, PTCRB, etc).</p> <p>From the TSG RAN point of view, we could attempt to conclude whether or not it would be beneficial to introduce a solution that enables the network to be able to know whether a UE has passed certification, and then communicate this to the relevant groups. We also observe that the example solution presented in the contribution would be transparent to the RAN, and so even this point may be better discussed within SA.</p>

Summary

11 companies have joined the initial round discussion. Except for 1 company, the other 10 companies acknowledge the importance for operators to know about the presence of non-3GPP compliant UEs in their networks, and most companies are willing to discuss how to address the concern from operators in 3GPP. However, there are certain aspects of the discussed proposals need further clarifications from SA (SA2/SA3) and GCF (SG).

3.2 Intermediate round

Feedback Form 3: Question 3: Do companies agree to send LS to both SA (including SA2 and SA3) and GCF (SG) for progressing the issue?

1 – VODAFONE Group Plc

In general, I think it is better if this topic will be discussed in corresponding groups directly. The proposed solution does not have RAN impact and therefore RAN plenary should probably stay neutral on this.

In addition it is not very clear to me, what is the aim of the first question. Is the proposal here, how to identify such UEs?

In general, the certification id might not be the best way to address this issue as also stated by other companies, there are not so many IDs, there are rather public and could be mis-used.

Not very sure there is a central server at all where such certificates could be retrieved and probably not all companies in this world apply for certificates, which does not mean they are not standard compliant.

We are in favour of having these discussions in 3GPP and we believe, we should work in the meantime to identify all benefits and drawbacks of proposed and alternative solutions and come back to corresponding plenary in the future.

2 – VODAFONE Group Plc

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3 – Apple Hungary Kft.

We want to start off by acknowledging that we agree that there would be issues (poor performance etc..) if there are UEs that are not conforming to the requirements that they are expected to fulfill. It would be in the interest of the entire wireless ecosystem that all the entities (UEs and NW nodes) fulfill their requirements to operate in the said ecosystem.

Our concern is that adding procedures in 3GPP to allow the NW nodes to know about non-conforming UEs, in a way legalizes this non-conforming behavior - and this was never the intention. Besides, if there are non-conforming UEs that intend to operate in a NW, any input we get from the UE to inform the NW about the conformance, can be changed by the UE. In other words, we cannot rely input from non-conforming UEs to behave correctly just for this. Regarding the comment on RAN4/5 on conformance testing, it is our view that RAN4/5 specifications have produced “deterministic” tests, which if run, would provide a result that tells if the UE is conforming or not. So in other words, the specification output from RAN4/5 is not at fault. GCF and other certification bodies have come up with a set of tests that assess the UE conformance and while we think this process has been an accepted way of UE certification in the wireless industry, as Huawei commented, this might be an area where something can be evaluated. But from 3GPP perspective, this is outside of it’s working parameters.

So if we are to send an LS to GCF/SG, we wonder what can we suggest them to ”improve/fix”. We are not even sure if GCF is the entity that needs to be improved. As mentioned earlier, it is our view that all the entities within the 3GPP wireless ecosystem try to conform to their respective requirements, and if there are some bad actors, the focus should be on how these were allowed to operate in the operator NWs, than create methods that depend on the UE to “self” declare about it’s conformance.

There are also other issues if we go down the 3GPP path: If this is to address the issue from Rel-15 with the UEs (including the said non-conforming UEs) already in the field, any changes we make to the standards from later releases would not address/fix these UEs. Also, any additional changes would not be implemented by the non-conforming UEs, and we are not sure if NWs can base their actions on the presence/absence of this query...

It is our view that, due evaluation should be done to see how/why such UEs got into the operator NWs and “if” such evaluation results in non-conforming UE from the oversight of 3GPP. If yes, 3GPP can resolve this.

It is important to note that the 3GPP standards rely on UEs complying to certain mandatory features and requirements and we should be very cautious before taking action that might make it easier for vendors to produce non-compliant devices, or even having the unintended consequence of encouraging non-compliant devices.

We hope companies can also take the above viewpoint when discussing this.

4 – Guangdong OPPO Mobile Telecom.

we are fine to send LS to certification body like GCF to indicate what is the problem in current field and check whether they have any idea what could be the cause of the problem and whether they can fix it. After getting feedback from certification body, we can further discuss whether this is an issue to be resolved by 3GPP and what is the potential solution, if necessary. Since the proposed solution is not in RAN’s scope, SA2/SA3 can be CCed but without any action.

5 – China Mobile Com. Corporation

Thanks Vodafone for the inputs here! I agree the proposed solution does not have RAN impact ”technically”, so RAN plenary may stay neutral from ”technical” aspect. However, as we notice, RAN features have been violated and RAN should have a clear attitude on this topic to facilitate the progress actively.

From my point of view, RP LS is a proper way to help 3GPP/other organizations to knowledge the importance of this issue and help people to focus on how to resolve the issue rather to waste time in arguing whether this need to be fixed or not.

For the 1st question, it is trying to find a general solution on how to identify non-3GPP compliant UEs automatically before customers' complaints pouring in.

As for the "UCA ID", I agree there could be "impersonated ID" and that is the reason why we need inputs from SA3. Believe how to authenticate the "UCA ID" is not a fake one should be in SA3 expert area.

As for the center server, even for now, operators already can "manually" access to all the certified UE info. And we are expecting an automated way now. LS to certification bodies may help us to confirm there is a "server" can help us on this automatically if group agrees.

As for the not-certified UEs, we indeed can not regard them as "not standard compliant". However, we still prefer to identify them since they may have "non-3GPP compliant" issues considering they have not passed any certifications at all. And what we have been going through recently indeed proves that we have a reason to do this.

We also in favour of having the discussion in 3GPP. However, it seems that there are quite a few questions raised related to certification bodies. It might deserve to send LS to certification bodies to seek for clarification if group agree.

6 – China Mobile Com. Corporation

Thanks Apple for agreeing this is an issue and need to be fixed. And thanks Apple for sharing further thoughts and inputs here.

As for Apple's concern that this solution may help to "legalize this non-conforming behavior", I'm afraid that I can not share the same opinion. We have police offices and courts. We use them to maintain a normal order in the society. We do not use them to "legalize/encourage the criminal behavior". This was never the intention.

As for Apple's comment "we cannot rely input from non-conforming UEs", this is not a new topic for SA3 experts at all. We can seek help from them first. As per my knowledge, SA3 work never depend on the UE to "self" declare itself.

As for Apple's comment "the specification output from RAN4/5 is not at fault", I totally agree. From my knowledge, RAN4/5 did perfect jobs. There is no mention of "RAN4/5" at all in RP-223071, and I see no comment saying RAN4/5 is at any fault. If I have missed anything, please alert me.

As for Apple's concern that "So if we are to send an LS to GCF/SG, we wonder what can we suggest them to "improve/fix"...", as per my knowledge, certification bodies also did good jobs. As you see in the LS there is no intention to suggest them to "improve/fix" anything at all. Just need some clarifications from the certification bodies—"To GCF (SG) and other certification bodies: How to select the test cases and provide the corresponding certification for the 3GPP mandatory features or operator interested 3GPP features?"

As for Apple's concern that this solution can not address/fix the old UEs, if I may, my suggestion would be, for the already existed bad UEs, we may use RACS to handle them. As for the potential bad UEs in the future, we use this new solutions to prevent them from happen.

Hope above can also be taken into consideration.

7 – China Mobile Com. Corporation

Thanks OPPO for the inputs.

The intention for the LS to certification body is to seek some clarifications. As for "check whether they have any idea what could be the cause of the problem and whether they can fix it", I'm not sure whether it is proper to send this request to certification bodies. The non-3GPP compliant UE did not apply for

certification at all, so I'm not sure certification body need to "fix" anything yet considering they have not been involved at all until now...

Besides, as per the comments collected during initial round, most companies think SA2/SA3 should be tasked to evaluate the solution. So I do see needs to require actions accordingly from SA2/SA3 also.

8 – vivo Communication Technology

Device Compliance issue is triggered by RAN input. We also recognize the proposed solution at least in this meeting is not in the RAN scope. Given that, inform SA on the background and seeking for potential solution is good way to go. About the LS to GCF, it is better to further discuss it until corresponding SA groups figure out proper solution. Some generic question to GCF shall be fine but still better to wait for further input from SA if any.

9 – vivo Communication Technology

Device Compliance issue is triggered by RAN input. We also recognize the proposed solution at least in this meeting is not in the RAN scope. Given that, inform SA on the background and seeking for potential solution is good way to go. About the LS to GCF, it is better to further discuss it until corresponding SA groups figure out proper solution. Some generic question to GCF shall be fine but still better to wait for further input from SA if any.

10 – TELECOM ITALIA S.p.A.

Many thanks to the moderator for managing the discussion. We think that the feedback from Vivo provides a good summary/way forward.

Concerning GCF and other certification bodies, at this stage we don't see the need to contact them. In case, we could inform them that some UE non-compliant to 3GPP specifications have been commercialised, and if they see any potential loophole for UE to be certified while being non-compliant

11 – CATT

As a RAN network vendor, we hope this kind UEs not exist. But since there are such UEs already, then it would be helpful to identify such UEs. It is ok for us to send LS to SA2/SA3 since RAN could not do any further evaluation to solve the problem. So currently, it's better to forward the issue to SA2/SA3, perhaps they could provide more professional and available solution.

12 – HuaWei Technologies Co.

We feel a bit early to trigger the LS to SA2/SA3. Without a common understanding on how GCF works today, SA2/SA3 may also get confused on what and how to proceed. Therefore we suggest we could first have a LS to GCF, to understand better how it works today. After getting the feedback, we could discuss further how to solve this issue.

13 – Intel Corporation (UK) Ltd

As commented by others, the solution proposed is completely within the domain of SA groups and the solution should be discussed there. Focusing on what is within RAN scope, I think what we might be able to conclude and communicate to SA groups is something like "TSG RAN has discussed and concluded that it would be beneficial for RAN operations for the network to be able to know whether a UE has passed certification by a relevant body".

14 – ZTE Corporation

We think the actual WGs that would be impacted by the final solution will only be known after the details of the solution are clear. From this perspective, we think the first step is to invoke the necessary work in the SA groups (SA2 and SA3) as proposed so that the details of the solution are understood. We are okay to also contact GCF (e.g. in CC). However, the overall communication/coordination with GCF can be left to SA groups once the solution details are clearer. We think it is appropriate to initiate this via an LS from RAN as clearly we have discussed this now for two meetings and there has been operator input and clear RAN level concerns on this as explained above. So, we are supportive of sending an LS to SA2/SA3 as a starting point (with GCF in CC).

15 – Nokia Corporation

We agree with others that the proposed solutions are completely within the domain of SA groups and therefore SA related solutions should be directly contributed to SA. If needed and preferred, RAN can indicate to SA what performance issues it has detected.

16 – VODAFONE Group Plc

As stated above, we are a bit concerned we are trying to drive a particular solution without discussing what are the problems.

What is the problem if GCF status is not known by the NW and what the NW is going to do with this status. If the status is not reliable, there is no way to develop any solutions. If we are going to write any LS, I believe it can only state that proposed solution was discussed in RAN plenary, where it was noted that it is outside of the RAN scope and RAN Plenary seek guidance if and how it should progress on this solution. In the meantime, the work between interested companies is needed to understand all pro and cons better.

17 – Intel Corporation (UK) Ltd

As commented by others, the solution proposed is completely within the domain of SA groups and the solution should be discussed there. Focussing on what is within RAN scope, I think what we might possibly be able to agree to communicate to SA groups is something like "TSG RAN has discussed and concluded that it would be beneficial for RAN operations for the network to be able to know whether a UE has passed certification by a relevant body".

18 – Qualcomm CDMA Technologies

We believe that there is an issue that we want to mitigate. Whether or not to send LS to SA, we are certainly open because the solution space seems to fall closer to their domain, but contributions could be made directly to SA for discussions to take place.

We believe that it would be good to understand better the certification process and what GCF or other certification bodies could do as part of the solution. Indeed, Figure 1 earlier in this document shows a "box" for "UCA server (e.g. GCF server)" without having checked with GCF on the feasibility of such entity. Therefore, before digging deeper into possible solutions, we believe that establishing communication with certification bodies is necessary, i.e., sending LS to GCF.

As started earlier, we believe that being able to fetch the certification status of a given UE would already be a good starting point for a solution to the problem. The fact that this procedure is in place may incentivize UE vendors to obtain certification for getting service from a given network operator.

19 – Ericsson LM

As the supporting companies say, we observe in fact that there are UEs that lack functionality which 3GPP declared mandatory (e.g. certain carrier bandwidths, number of RXs/layers) and, even more typical, UEs that implement functionality incorrectly (Not to blame anyone! Errors happen... and sometimes hide themselves well).

However, we hardly receive requests from operators to reject those UEs but rather to find work-arounds to accept and serve UEs despite lack of mandatory functionality. If the UE indicates too few MIMO layer or a too narrow carrier bandwidth in its UE capabilities, the network can account for that and serve the UE anyway. Of course, the network could alternatively reject such UEs but as said, we never got such requests from any operator.

More problematic are errors or limitations that the UE does not expose in its capabilities. The network has currently no means to identify such UEs reliably and to refrain from configuring functionality which is known to cause problems with that UE. One could consider detecting those UEs based on their IMEI-SV. But since most bugs originate from the chipset, they typically affect many UEs and hence many IMEI-SVs. Detecting all affected UEs and classifying their IMEI-SVs would be tedious and require a lot of time during which end-users would experience bad performance. Furthermore, it can be observed that IMEI-SVs are not well-maintained and hence hardly reliable. Furthermore, most core networks don't pass the IMEI-SV to the RAN by default.

One should also note that the proposed UE-assigned "certification ID" is technically the same as the already specified but unused UE-assigned "UE capability ID". Apparently, UE vendors had no big interest in maintaining consistent IDs across all hard- and software versions of their devices. The need for a new core-network function doesn't make any of these features likely to appear on the market either.

We foresee that similar issues as with IMEI-SV and UE-Capability ID would arise with a UE specific certification ID.

We do however observe that chipset vendors are very reliable in maintaining the hard- and software versions of their chipsets. And they are usually aware which bug exists in which version. However, the chipset version is unknown to the network. Hence, we would rather see a benefit in conveying a chipset-ID in the UE-NR-Capabilities which identifies the chipset vendor and the hard- and software version. Based on our observations such ID would make it a lot easier to cope with UEs that are known to cause issues in the field. And since the UE-NR-Capabilities go straight to the gNB the solution would also be a lot easier to utilize. As such, it is within RAN's domain.

20 – Deutsche Telekom AG

We do not think that anything in 3GPP is needed at all. As already commented last time when this was proposed, with IMEI-SV and the UE capability signalling (incl. RACS) the operator has means available to identify and treat UEs in question.

We strongly encourage our suppliers to take 3GPP specification seriously and comply to the defined 3GPP and GCF requirements !

Question 4: If the answer of Q3 is yes, do you agree to address the following aspects in the LS?

(1) Non-3GPP compliant UEs, not supporting 3GPP mandatory requirements, appeared in the network. 3GPP RAN mandatory features are not supported by these UEs.

(2) RAN consulting SA whether there is an automated way enabling operators to query about the status of certification for a given UE. If not, can SA provide such method to achieve this?

(3) To GCF (SG) and other certification bodies: How to select the test cases and provide the corresponding certification for the 3GPP mandatory features or operator interested 3GPP features?

Feedback Form 4: Question 4: If the answer of Q3 is yes, do you agree to address the above-mentioned aspects in the LS?

1 – ZTE Corporation

1) and 2) above seem okay in general. For 3) may be we can leave the further coordination between GCF etc to SA groups as and when necessary, once they develop the solution details.

2 – HuaWei Technologies Co.

We think basically it would be good to reach some common understanding on the below from GCF, the principle of 3) made by the moderator looks good, perhaps we can improve the wording a bit as below:

It is observed that there are non-compliant UEs in the field, which do not support mandatory features defined in 3GPP. Therefore It is better for 3GPP to understand the way of working for GCF and other certification bodies.

3GPP kindly asks GCF (SG) about the below:

1. How GCF selects the test cases today, e.g. whether the mandatory features defined in 3GPP or features interested by operators will be essentially tested.
2. Under which conditions the certification can be provided.

3 – Intel Corporation (UK) Ltd

For 1), this is part of the background information and would be OK to include.

For 2), we would suggest to keep within RAN scope and could consider saying something similar to what we suggested in the previous question

For 3), many companies here will participate in GCF activities and I'd suggest more checking and discussion before we send questions in an LS.

4 – Qualcomm CDMA Technologies

OK with 1)

OK with 2) noting that part of the question, namely, "whether there is an automated way enabling operators to query about the status of certification for a given UE" also should apply to 3).

Re. 3) we believe that Huawei's wording is better and could be further polished as follows:

It is observed that there are non-compliant UEs in the field, which do not support mandatory features defined in 3GPP. Therefore, it is desirable for 3GPP to better understand the way GCF and other certification bodies operate.

3GPP kindly asks GCF (SG) about the following:

1. How GCF selects the test cases today, including coverage of mandatory features defined in 3GPP and features of interest to operators?
2. Could we devise an automated way enabling operators to query (real-time) about the status of certification for a given UE?
3. Under which conditions the conformance certification can be provided?

5 – Deutsche Telekom AG

No we do not agree to send any LS outside 3GPP at this point in time !

Summary:

14 companies have joined the intermediate round discussion. 12 companies are ok with sending LS to SA. 6 companies prefer not to send LS to GCF for the time being, while 3 companies prefer to send LS to GCF for some clarification.

3.3 Final round

Based on two rounds discussion so far, moderator proposes the following proposals:

Proposal 1: Send LS to SA, SA2 and SA3 for guidance to only address the following aspects and no technical solution or direction will be mentioned:

(1) It is observed that there are non-3GPP-compliant UEs in the field, which do not support mandatory features defined in 3GPP RAN and are not certified.

(2) TSG RAN has discussed and concluded that it would be beneficial for RAN operations for the operators/network to be able to query about the status of certification for a given UE.

(3) RAN kindly consults SA whether there is existing solution enabling bullet (2). If not, can SA provide method to achieve this?

Proposal 2: A short post-meeting email discussion is used to polish the wording of the LS if proposal 1 agreed.

Proposal 3: There is no need to send LS outside 3GPP for this issue at this point in time.

Moderator encourages CMCC or other companies who interested in this issue to provide the technical solution to proper working groups next year...

Moderator also encourages companies to do some homework on internal investigation and discussion with your colleagues working in GCF or other certification bodies on this issue.

Feedback Form 5: Do you agree proposal 1?

1 – T-Mobile USA Inc.

The certification of a device may lag its introduction into the market by many months. It is no secret that certification by one of the bodies is not something that all operators require to sell or allow a device. Often times, marketing and hype of the drivers of what devices will be sold and allowed. It is also no surprise that some of the non-compliant with 3GPP mandatory feature devices are not just from small vendors, but the largest. The impact of these devices onto a network is validated, and either tolerated or not by individual operators who employ their own criteria. The ability to reject these can occur using methods that already exists e.g. IMEI white/black listing, UE capability signaling, etc. T-Mobile USA would rather favour that certification bodies ensure that mandatory features are tested in a more timely manner. We see no action for 3GPP at this time.

2 – Apple Hungary Kft.

First up, **we do not think the summary accurately reflects the responses from intermediate round and so we do not accept the summary!** There are atleast 6 companies who think an LS to SA is not needed or premature and a couple of them felt that an LS to GCF might be better than to SA at this time. Stating that 12 out of 14 are ok to send an LS to SA is a grossly inaccurate and misleading assessment.

Also, we feel that based on the views expressed by the majority of the companies the summary is better reflected with the wording (as suggested by Intel): “It is beneficial for the NW to know if the UE has passed certification by a relevant body” than what is worded in Proposal 1-2.

Regarding the views on proposal 1:

1-1 : we agree with this statement.

1-2: this is not correct. TSG has NOT concluded.

1-3 : we do not agree for an LS. The companies can submit papers in SA to bring this topic up. RAN TSG does not need to trigger an LS for this purpose. There are a number of companies who have expressed similar sentiment, that SA can discuss on their own and RAN doesn't need to trigger the SA discussion.

P2 : We do not agree as well.

P3: Is not relevant, based on our views above.

3 – Beijing Xiaomi Mobile Software

We are open to send LS to SA, since the issue to solve is more related to SA. RAN has not clearly understood how GCF works and should not make any decision on this issue.

1-1: we are ok with it.

1-2: we do not agree. We prefer to rewording it to: ”RAN has discussed this issue for two meeting but no conclusion is made. RAN thinks this issue is more related to SA.”

1-3: We do not agree. We prefer to rewording it to: ”RAN kindly leave this issue to SA to decide whether it should be addressed by 3GPP or not.”

4 – Verizon UK Ltd

I think the discussion is getting more and more interesting. And I think it is moving to the right direction seeing some of the latest comments.

Our first suggestion is let's calm down, think through before taking action - picking a place to send a LS. I think there may be some issues with the proposed solution and I also worry about potential unexpected outcomes. But still, as an operator, we certainly share a lot common interest with fellow operators and hate non-conforming UEs. Among the operators, we are more aligned with DT and Tmus. We have been doing exactly what DT said in their bold statement with great emphasis and so far, it is working. We also understand we have options if the first option - enforcing GCF fails, we have 2nd option, again, as DT suggested. Fortunately, and largely because our vendor partners' diligence, there hasn't been much a need even for that.

Then, I will say we agree with Ericsson on a lot of their observations - if there is a UE behavior problem, it is more likely due to bad implementations not caught by GCF than not going through GCF itself. In that case, what can we do? implementing workaround or dealing with/"upgrading"/rejecting millions sold phones? - it is obvious. This is the reality.

Honestly, if we (this group) are thinking about asking UE their GCF versions, we (VZ) would much prefer to ask UEs their chipset version - that would be our wildest dream if it could ever come true. So we fully support Ericsson on that - that is our preferred new signaling, if the group is considering a "solution" :-)

5 – China Mobile Com. Corporation

Thanks for the discussion and inputs here.

As encouraged by moderator in the final round, the technical solutions are to be directly brought to the proper working groups (SA) in the future. So we can just focus on the potential LS without discussing the specific technical solution for the time being in RAN.

RAN has spent 2 valuable meeting cycles to discuss this topic, and finally companies knowledge operators' concerns and the importance for operators/networks to know about the presence of non-3GPP compliant UEs in the network. **An LS to SA can give SA a quick summary on what happened in RAN during the past 2 meeting cycles and help SA to avoid wasting another 2 meeting cycles to confirm this is an issue need to be taken care of.**

If there is any existing solution can fix the issue, CMCC is totally fine with it. Let's wait for the comments from SA experts.

Please find the initial draft LS as below for group review. I would like to encourage the group to take it as the base and polish the wording together.

Thanks.

1 Overall description

It is observed that there are non-3GPP-compliant UEs in the field, which do not support mandatory features defined in 3GPP RAN. TSG RAN has discussed about this topic at RAN#97e and RAN#98e, and concluded that it would be beneficial for RAN operations for the operators/networks to be able to query about the status of certification for a given UE.

2 Actions

To SA (SA2, SA3)

ACTION: RAN respectfully consults SA whether there is any existing solution enabling operators/networks to be able to query about the status of certification for a given UE. If not, RAN respectfully requests SA to provide method to achieve this.

6 – Guangdong OPPO Mobile Telecom.

We support to send LS to both SA and GCF, but not to SA2/SA3 since we are still discussing whether this should be treated in 3GPP or not and there is no consensus yet in RAN.

As for the LS content, it should focus on the description of the problem itself. We are also fine to capture what happened in RAN to save precious meeting time for SA. Then RAN can leave the rest to SA since the potential solution direction falls within SA's expertise. If RAN trusts SA (that's why we send LS to them :), we think SA will take proper action.

7 – ZTE Corporation

As already noted above, we are supportive of the overall goal to investigate solutions for this issue. So, we agree to send an LS to SA groups. We don't have a strong view whether to include SA2 and SA3 in the loop (this can also be done by SA if companies have concerns in including them at this stage as the exact groups to include depends on the solution details). So, a simple LS indicating the problem of lack of support of mandatory RAN features and the requirement from operators to know the status of certification for a given UE would be sufficient and the wording above provided by CMCC in the comment looks good from our perspective. We can leave the rest to SA groups.

8 – TELECOM ITALIA S.p.A.

we support sending the LS with the rewording done by CMCC. As a minimum, this is a matter SA / SA2 / SA3 must be made aware of. Due to the current workload, company proposals will not be treated in SA2 and SA3 if there is not a trigger from RAN. Note that due to SA2 and SA3 being behind schedule, SA decided to delay the completion of Rel 18 by three months and clearly they will not discuss "new" topics, if not triggered by RAN

9 – CATT

We also support sending the LS to SA groups. The draft LS provided by CMCC looks good. SA, SA2 and SA3 could all be involved.

10 – Ericsson LM

As indicated in our earlier reply, the issue is not lack of certification but rather that certified UEs have bugs. And again: we understand that bugs sneak in to the implementations and sometimes it can take considerable time to identify the exact bug. And when the bug has been identified in a particular UE, a work-around needs to be found. Oftentimes those work-arounds are to completely disable a certain feature for a certain type of UEs.

Given this we do not think that an indication stating whether the UE is certified or not is going to help. Certified UEs can also have bugs. And "certified UE#1 with chipset#1" can have a completely different set of bugs than "certified UE#2 with chipset#2". We, as a network vendor, have to treat these UEs differently and apply different workarounds for these different UEs. So to us, instead of a certified/not-certified indication, our gNBs would need to know which particular chipset model the UE has so we can apply the correct work-around.

It seems more time for discussion in plenary is needed to converge on what is the root cause of the problem and how it could potentially be addressed. Before we have a common understanding on this we don't think we can send an LS.

11 – Deutsche Telekom AG

Similar to TMUS and what we said already many times before: We also do not see any action required in 3GPP and especially still do not see how such devices could be publically identified ?!

We do not support Proposal 1

12 – vivo Communication Technology

As we commented before, we think no harm to inform SA on some RAN findings. Given that, CMCC's draft could be used as a starting point, detailed wording can be further discussed as proposed by Moderator in P2. Also, holding the LS to outside 3GPP before 3GPP has clear solution is the best way to go at this moment. In summary, we support Moderators proposals, P1, P2 and P3.

13 – Apple Hungary Kft.

We are again puzzled by the way this is being moderated! It is mentioned that "TSG RAN has discussed about this topic at RAN#97e and RAN#98e, **and concluded** that it would be beneficial for RAN operations for the operators/networks **to be able to query about the status of certification** for a given UE."

There are companies expressing concerns on this 3GPP based query altogether (and on the veracity of UE reporting), and some companies mentioning to first understand the GCF process before getting SA involved. At least 2 operators mentioned that this entire thing is outside of 3GPP (this implies SA as well). Some other companies mentioned that this is outside of RAN. Another operator wondered what we can send to SA, except that RAN did not reach a consensus, and that RAN noted this discussion.

With all of the above, how can we send an LS to SA stating that RAN has concluded, and see it beneficial for a query (thereby suggesting a solution direction)?

To us, the better reflection of the the discussion in RAN is that "RAN has discussed with no consensus, except that this is outside of RAN".

We request moderator to reflect the summary based on the sentiments of all the companies who voiced their view.

There is nothing preventing companies to submit papers in SA and take this discussion there.

14 – China Mobile Com. Corporation

To Ericsson: As for your analysis "certified UEs have bugs", it seems that we are talking about totally different things here. As per my understanding, "bugs" means UE accidentally fail to meet the requirements although UE has tried the best or "bugs sneak into the implementations" (in your words).

However, the bad UE we're talking about just intentionally do not follow the 3GPP requirements. "Bugs" UE thought itself as a 3GPP-compliant one, while the bad UE I'm talking about clearly knows itself being a non-3GPP compliant UE. It is not "bugs sneak into the implementation" but "bugs have been put into the implementation".

So from my understanding, Ericsson is talking about something different from RP-223071. Maybe Ericsson can trigger another discussion about how to identify/fix "bugs" in UE which has nothing to do with what I have been talking about here.

15 – MediaTek Inc.

As commented in the initial round, we see it difficult for RAN to assess the example proposal that was submitted - this would require expertise outside RAN (SA2/SA3) - which is *not* the same as saying we would support sending an LS from RAN. We recommended in the initial round that company inputs would be a viable route. But as Ericsson commented above, while a problem is acknowledged, there does not appear to be a common understanding on what the root cause of the problem is - we think it is important that the same understanding first be reached before diving into solution space. And we certainly welcome more discussion on that front, as the overall intention is the right one.

Importantly, we observe operators, who are first in line, have expressed very different opinions - which somehow complicates the matter. Might it help in the future if e.g. some collective input from GSMA were submitted?

16 – Intel Corporation (UK) Ltd

Regarding the point (2), although the baseline of the text was suggested by us in the intermediate round, it has now been changed to mention 'querying status' which is to starting to point to a solution that is not in RAN scope. However, more importantly, I think the discussion is currently far from concluding that it would be beneficial for the network know whether a UE has passed certification. Even amongst the operators on this thread I see quite different opinions. Without RAN conclusion on this benefit, I do not think it will be possible to send an LS.

17 – China Mobile Com. Corporation

To Apple: I'm quite puzzled by the misleading way you commented here. The wording you mentioned and commented was proposed by CMCC not by moderator. I can only stand for CMCC and I'm only sharing CMCC's proposals/comments/inputs here.

Basing on the inputs from the other companies, CMCC is trying to propose a draft LS as the baseline for group to comments and try to make some progress to address operators' concern. So far, it has received 6 supports at least, which also deserves Apple's attention. To avoid issues does not help to solve the problems at all.

The comments you have collected were given after the draft LS was posted, maybe we can address them in the updated version if possible. And CMCC is always open to hear other comments to make things better.

18 – VODAFONE Group Plc

We like to support the discussion and definitely like it progress, but I feel we can't say at this point of time, RAN agreed now anything. I am also not against to send an LS to SA Plenary or SA2 asking to look over the submitted proposal as it is outside of RAN scope.

Feedback Form 6: Do you agree proposal 2?

1 – Apple Hungary Kft.

Do not agree.

2 – Deutsche Telekom AG

We do not agree

3 – Intel Corporation (UK) Ltd

Although it is normal practice in some WGs to approve LSs by post meeting email discussion, this is not normal for RAN. So we do not agree this approach.

Feedback Form 7: Do you agree proposal 3?

1 – Apple Hungary Kft.

It is our view that this outside of RAN. And so RAN does not need to do anything.

2 – Deutsche Telekom AG

We agree

3 – Intel Corporation (UK) Ltd

We agree

Summary

15 companies have joined the final round discussion.

7 companies support to send LS to SA, including CMCC, Telecom Italia, ZTE, Xiaomi, OPPO, CATT and Vivo.

Another 7 companies do not support to send LS to SA, including Apple, MTK, Intel, Ericsson, T-mobile, Verizon and DT.

1 company (Vodafone) indicate not to against to send LS.

4 Conclusion

Based on 3 rounds of discussion, 18 companies have joined the discussion. Companies acknowledge the non-3GPP-compliant UE issues. It is observed that there are non-3GPP-compliant UEs in the field, which do not support mandatory features defined in 3GPP RAN. TSG RAN has discussed how to handle this issue. However, no consensus has been reached.

It is the moderator's responsibility to lead the discussion to achieve consensus and progress. That's why proposals are provided in the final round, which based on the exiting situation of the pervious two rounds of discussion and trying to move forward one step. Please note that it is called proposals rather than conclusion. However unfortunately, it seems no consensus on how to take further action on handling this issue. Moderator suggest to close the discussion for now and capture the related documents as noted.

To Apple "We request moderator to reflect the summary based on the sentiments of all the companies who voiced their view.":

Moderator heard Apple's voice. Moderator heard the voice of all the companies, heard the voice of requesting us to respect the Seriousness of our work in 3GPP including 3GPP specifications, and heard the voice of requesting to keep the 3GPP whole ecosystem healthy as well. :-)