

**Technical Specification Group Services and System Aspects TSGS#9(00)0360  
Meeting #9, Hawaii, USA, 25-28 September 2000**

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3GPP TSG SA WG1  
17-21 July 2000, Taastrup, Denmark

S1-000563  
Agenda item 6.4 & 7.4

**To:** 3GPP TSGs SA, CN, RAN, T  
**Source:** TSG SA WG1<sup>1</sup>  
**Title:** Proposed LS on status of IMEI coding

### **Introduction**

3GPP has recently been considering proposals to change the coding format of IMEIs from BCD to Hexadecimal. At the TSG meetings in June, it was agreed to wait for feedback from the GSM Association and EICTA before progressing with the change.

At its April 2000 meeting, SA WG1 also invited feedback on this proposal from various bodies. SA WG1 has received feedback at its meeting on 17-21 July 2000 and wishes to make this available to the 3GPP TSGs.

### **Summary of feedback received**

S1 has received several input papers on the subject of hexadecimal IMEI:

#### GSM-Association TWG

The GSMA TWG Chair replied in a letter to the S1 chair (attached, S1-000517). The TWG questions the need for the change, highlights the considerable impact on current infrastructure, and concludes “that this proposal if adopted would create more problems than it supposedly solves and it is totally unnecessary.”

The TWG suggest that the introduction of hexadecimal IMEI is deferred until an ad-hoc group of the GSMA TWG and the GCF meets in September and produces a considered opinion on this issue.

#### GSM-Association Security SG (SG)

In a LS to 3GPP TSG SA WG1 (S1-000497), the GSMA SG states they have no security concerns over the hexadecimal IMEI, however the use of a default IMEI would cause security and technical problems. The SG thought the right approach would be to introduce an agreed date by which operators could have ensured that their networks could support the new IMEI.

#### Pacific Bell Wireless input to SA1

PBW presented a paper to SA1 (attached, S1-000519). In this paper, it is recommended that a solution and cut over date should be agreed upon only after a complete proposal is provided which considers:

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<sup>1</sup> Nick Sampson, Orange PCS Ltd (nick.sampson@orange.co.uk)

1. When a solution is required
2. Consideration and evaluation of alternatives
3. Impacts of the recommended solution.

This paper received support from other operators in S1.

#### Liaisons from RAN2, RAN3 and CN4

These have already been sent to various groups and are not attached here. In summary, RAN2 and RAN3 stated that their specifications allow for the use of hexadecimal IMEIs. CN4 raised concerns over backward compatibility of the hexadecimal IMEI and proposed a 'cut-over' date, before which use of hexadecimal IMEI is not allowed.

#### **Proposal**

The hexadecimal IMEI requirement was raised by terminal manufacturers, but the major impact will be on network operators' (and even service providers') system.

S1 notes that an ad-hoc meeting of the GSMA TWG and GCF (where both operators and manufacturers are represented) will discuss the IMEI issue in September, and therefore suggests that 3GPP defer discussion of IMEI changes until the output from this meeting is available.

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**SUBJECT: Hexadecimal format for IMEI**

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To: Mr Alan Cox Chairman 3GPP S1

Ref: Nokia's proposals to 3GPP for the IMEI format change to hexadecimal.

Dear Mr Cox,

TWG has reviewed the recent proposal from Nokia, which required that the IMEI numbering would be changed to a "Hexadecimal format" for future use on 3G terminals. The reason given was that the current IMEI numbering system restricted the IMEI numbering range to 1 million phones for a specific TAC & FAC. This particular argument, however, is flawed and there is strong evidence that currently manufacturers do not take advantage of the full range of FAC (final assembly codes) that are available to every manufacturer which would extend the range considerably. The TAC (formerly Type Approval Code) now described as the Type Allocation Code could be also used to increase still further the numbering ranges of IMEI's to provide much greater manufacturing numbers using the current format.

The impact that this proposal would have on the current 2G infrastructure, interoperability with 2G, billing systems and even bar code reading is considerable. TWG has discussed this issue at length and concludes that this proposal if adopted would create more problems than it supposedly solves and it is totally unnecessary.

At a recent meeting of the "First Dialogue for the R&TTE sector" in Brussels the manufacturers raised the issue of Allocation procedures for the IMEI and proposed several suggested ways forward to address their concerns. At my instigation an adhoc meeting is to be convened in September to coincide with the GCF agreement group meeting and also the TWG meeting in Israel. At this meeting with both sides of the Industry present, it is hoped that the whole issue of IMEI allocation and numbering ranges will be discussed and will result in a sensible solution that all sectors of the Industry can agree with.

May I therefore respectfully suggest that the Nokia proposed CR for the introduction of Hexadecimal IMEI is deferred until this adhoc group meets and produces a considered opinion on this issue.

Yours sincerely

## 1.1 David B.Nelson

David B.Nelson

GSM TWG Chairman

**Meeting Number**      **SG#36**  
**Meeting Date**        **31<sup>st</sup> May to 2<sup>nd</sup> June 2000**  
**Meeting Location**    **Istanbul, Turkey**

**SG Doc 034/00**

**Title**                  Liaison statement to 3GPP and TWG  
**Source**                SG#36  
**Date**                    26<sup>th</sup> June 2000

<b>Read Access*:</b>		
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<b>2 Unrestricted</b>		

<b>2.1 Information Category</b>	Liaison Statement
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**Summary:**

Liaison statement to 3GPP, copied to TWG, regarding support for hexadecimal coding of IMEIs.

## Liaison Statement:

**Title:** Liaison statement regarding IMEI format for UMTS  
**To:** 3GPP TSG SA1, dated 1<sup>st</sup> May 2000  
**From:** GSM Association, Security Group  
**Copy:** GSMA TWG, TADIG  
**Date:** 26<sup>th</sup> June 2000

The GSM Association Security Group thanks 3GPP TSG SA1 for the sight of the above LS.

We have no security concerns about the extension of the IMEI by using the hexadecimal format.

Concerns were expressed about how the new format IMEI's could be introduced without using mechanisms such as default values, as it was felt that a default IMEI would certainly cause security and technical problems. The SG thought the right approach would be to introduce an agreed date by which operators could have ensured that their networks could support the new IMEI. This would depend on manufacturers producing releases to handle this issue.

This LS is copied to TWG for information, and TADIG for the CEIR issues.

End of LS

**Source:** Pacific Bell Wireless  
**Title:** IMEI Exhaustion Considerations  
**For:** Information Only

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## 1. Summary

The available supply of unique International Mobile station Equipment Identities (IMEIs) will become exhausted in the future. It has been proposed to change the encoding of the IMEI from decimal digits to hexadecimal digits. The 3GPP has requested the GSM Association to provide a date by which all carriers will update their GSM/UMTS networks to accommodate hexadecimal IMEIs.

It is recommended that a solution and cut over date should be agreed upon only after a complete proposal is provided which considers:

1. When a solution is required
  2. Consideration and evaluation of alternatives
  3. Impacts of the recommended solution
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## 2. Background Information

The **IMEI** is used to uniquely identify each handset, and may not be updated after the mobile is manufactured. It is composed of the following fields:

- **TAC**: Type Approval Code, 6 digits;
  - issued by a central body
- **FAC**: Final Assembly Code, 2 digits;
  - identifies the place of manufacture/final assembly,
  - encoded by the manufacturer
- **SNR**: Serial Number, 6 digits
  - - an individual serial number uniquely identifying each equipment within each TAC and FAC
  - are sequentially allocated by the manufacturer
- Spare digit: this digit is zero, when transmitted by the MS.

Additionally, an “**IMEISV**” exists which is the “International Mobile station Equipment Identity and Software Version Number”. It consists of the TAC, FAC, and SNR as defined above, plus:

- **SVN**: software version number, two digits
  - Identifies the software version number of the mobile

- The SVN field may be updated after the mobile is manufactured.

Any changes made to the IMEI would also impact the IMEISV.

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### 3. The Problem

The existing scheme provides a maximum of 1,000,000 distinct IMEIs for a given combination of TAC and FAC. At some time in the future, the available number of unique identifiers will become exhausted. Estimates of when this will happen range up to 10 years.

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### 4. The Proposed Solution

Each digit in the IMEI (TAC, FAC, and SNR) is carried in 4 bits, so in theory hexadecimal digits could be used to extend the range of the values from 0-9 to 0-9 + "A-F". However, ISUP protocol restrictions prevent usage of the hexadecimal digit "F". Allowing the usage of digits 0-9 and "A-E" expands the possible number of unique combinations from 1,000,000 to 16,777,216 for each TAC/FAC combination. With this solution "old" networks would not recognize the hexadecimal IMEI of "new" handsets. All networks would need to be upgraded to recognize and properly handle mobiles using hexadecimal IMEIs. The proposed solution will require upgrading all GSM and UMTS releases.

It would be reasonable to assume the transition would take place no sooner than 2 years after standards were in place.

At the June 2000, 3GPP SA plenary meeting the following agreements were reached:

- Infrastructure changes should be applied to all releases, not just R99.
- Changes should be applied by a cutoff date to be determined by the GSM Association.
- Changes to standards are pending a response from the GSM Association.

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### 5. Considerations

The following items may be worth further consideration before agreeing to the current proposal.

- When is a solution required?
  - When will the current supply of IMEIs become exhausted?
    - Opinions range from 3 to 10 years.
  - Networks would need to be updated before updated handsets are released into the marketplace.
  - GSM networks currently exist in approximately 144 countries. Although a cut over date can be agreed upon by which all GSM/3GPP standards compliant systems must make the recommended upgrade, the reality is that some systems probably won't make the transition.
  - What are the consequences for subscribers in networks that have not performed the upgrade?
- What are the impacts of the proposed hexadecimal solution (is it acceptable)?
  - To what degree will external systems' interfaces, not covered by GSM/3GPP standards, be adversely impacted (Emergency services PSAPs, billing systems, others?)?
  - Consideration needs to be provided for interoperability testing.
- To what degree have alternatives been considered?
  - Should a more future proof (perhaps variable length encoding) scheme be pursued?
    - The current proposal is still a fixed length scheme. When will the supply again become exhausted? To what degree has consideration been given to the usage of IMEIs in the future in other devices (PDAs, blue tooth connected devices, etc.), and the possible impact

- this would have on the available supply.
- Is the initial assumption, that the length of the IMEI can not be changed, still valid?
    - Would an extended decimal field, allowing more than 6 digits, be preferable as a long term and possibly backward compatible solution?
    - Would restructuring the IMEI (possibly reducing the TAC/FAC fields to increase the SN field), while continuing to use decimal digits, be preferable?

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## 6. Recommendations

It is recommended that a proposed solution and cut over date should be agreed upon only after a complete proposal is provided which considers:

1. When a solution is required
2. Consideration and evaluation of alternatives
3. Impacts of the recommended solution