**3GPP TSG- Meeting # *887***

**, , - revision of S5-243554**

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| *CR-Form-v12.3* |
| **CHANGE REQUEST** |
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|  |  | **CR** |  | **rev** | **3** | **Current version:** |  |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **X** | Core Network | **X** |

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|  |
| ***Title:***  |  |
|  |  |
| ***Source to WG:*** | , China Mobile, China Unicom, China Telecom, Verizon, KDDI, NTT Docomo, Deutsche Telekom, Vodafone, Huawei |
| ***Source to TSG:*** | S5 |
|  |  |
| ***Work item code:*** |  |  | ***Date:*** |  |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** |  |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19) Rel-20 (Release 20)* |
|  |  |
| ***Reason for change:*** | * Iteroperability: recommended probableCause (PC) string values are described in the Annex B in 28.111 but as PC can have the type “string or integer”, it is required to recommend integer value too. Annex B lists commonly used string values based on ITU standards. However, it provides no guidance for implementations using the integer values of probableCause. As the goal of 3GPP specifications is to provide interoperability, the specification should provide guidance on how to use integers for probableCause.
* Backward compatibility: 3GPP TS 32.111-3 Annex A defined PC integer values for LTE and 3G networks are now absent from 5G specs. The proposed change in this CR will provide in 3GPP a backward compatible solution for PC integer values. It will be an advantage for existing integer based Fault management consumers that will preserve their current implementation for old and new networks. Many existing management systems use the CORBA mapping for probableCause (from TS 32.111) which defines integers values. To maintain compatibility for these systems, for the same alarming conditions the same numerical values should be used. In addition, from a Fault Management Service producer prospective specified numerical values can be preserved transferring the same information in a numerical form on other protocols e.g. SNMP.
* Filtering mechanisms definition in 3GPP MOCs: Well defined probable cause values are also needed for filtering of alarm related notifications. ProbableCause is one of the most important parameters to filter. A management systems may want to use the same notification filter on multiple nodes from multiple vendors. This cannot be accomplished without standardized values.
* Common understanding: Numerical values for the probableCause should be added to the annex to provide common understanding about integer values to be used in respect to the string values
* Easy implementation based on integer values: Numerical values are often used instead of string values because:
	+ comparing numerical values is much simpler than comparing string values
	+ string values can be misspelled and the capitalization has often been used in an inconsistent way, which was seen in probableCause and other items like enums or attribute names
	+ the same probable cause string is spelled differently in different standards increasing the probability of comparison failure:

 X.733 - "Application subsystem failure" 3GPP 32.111-2 - "Application Subsystem Failure" 3GPP 32.111-3 - "APPLICATION\_SUBSYSTEM\_FAILURE" 3GPP 28.111 - "Application Subsystem Failure "* if string are internationalized string comparision becomes more difficult
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|  |  |
| ***Summary of change:*** | - Add the numerical values for probableCause from TS 32.111-3 into Annex B of this specification.- Reformat notes about duplicated and reserved probableCause values, because (according to EditHelp) notes would have to be at the end of each table, while this information is more useful embedded in the table at the relevant numerical value. |
|  |  |
| ***Consequences if not approved:*** | No interoperability for numerical probableCause values due to no integer value definition in the specification even if integer is an allowed standardized type.No backward compatible solution to 3GPP TS 32.111-3 Annex A is supported for Fault Management Service consumers. More complex probable cause filtering and comparison if string values are used |
|  |  |
| ***Clauses affected:*** | Annex B |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **X** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
|  |  |
| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

***First change***

Annex B (informative):
Probable Causes

This annex lists probable causes.

Sources of these probable causes are ITU-T Recommendation M.3100 [7], ITU‑T Recommendation X.733 [8], and ITU-T Recommendation X.736 [13]. In addition, probable causes for wireless systems are listed in ETSI TS 101 251 V6.3.0 (1999-07) [3].

NOTE 1: Probable causes that are defined by more than one standard have been removed to ensure unicity.

The specified probable cause values should be used. If the listed values do not fit to the probable cause then vendors may use additional values with respect to the values defined in the annex..

Numeric values that are not used due to duplication should not be reused as vendor specific values.

**Table B.1: Probable Causes from ITU-T Recommendation M.3100 [7]**

| **M.3100 Probable cause (string)**  | **(integer)** | **Event Type** |
| --- | --- | --- |
| Indeterminate  | 0 | Unknown |
| Alarm Indication Signal (AIS)  | 1 | Communications |
| Call Setup Failure  | 2 | Communications |
| Degraded Signal  | 3 | Communications |
| Far End Receiver Failure (FERF)  | 4 | Communications |
| Framing Error  | 5 | Communications |
| Loss Of Frame (LOF) | 6 | Communications |
| Loss Of Pointer (LOP)  | 7 | Communications |
| Loss Of Signal (LOS)  | 8 | Communications |
| Payload Type Mismatch  | 9 | Communications |
| Corresponds to a duplicated probable cause; not used | 10 |  |
| Remote Alarm Interface  | 11 | Communications |
| Excessive Bit Error Rate (EBER)  | 12 | Communications |
| Path Trace Mismatch  | 13 | Communications |
| Unavailable  | 14 | Communications |
| Signal Label Mismatch  | 15 | Communications |
| Loss Of Multi Frame  | 16 | Communications |
| Communications Receive Failure | 17 | Communications |
| Communications Transmit Failure  | 18 | Communications |
| Modulation Failure | 19 | Communications |
| Demodulation Failure  | 20 | Communications |
| Corresponds to a duplicated probable cause; not used | 21-26 |  |
| Reserved for M.3100 potential future extensions. | 27-50 |  |
| Back Plane Failure | 51 | Equipment |
| Data Set Problem | 52 | Equipment |
| Equipment Identifier Duplication  | 53 | Equipment |
| External IF Device Problem  | 54 | Equipment |
| Line Card Problem  | 55 | Equipment |
| Multiplexer Problem  | 56 | Equipment |
| NE Identifier Duplication  | 57 | Equipment |
| Power Problem  | 58 | Equipment |
|  |  |  |
| Processor Problem  | 59 | Equipment |
| Protection Path Failure  | 60 | Equipment |
| Receiver Failure  | 61 | Equipment |
| Replaceable Unit Missing  | 62 | Equipment |
| Replaceable Unit Type Mismatch  | 63 | Equipment |
| Synchronization Source Mismatch  | 64 | Equipment |
| Terminal Problem  | 65 | Equipment |
| Timing Problem  | 66 | Equipment |
| Transmitter Failure  | 67 | Equipment |
| Trunk Card Problem | 68 | Equipment |
| Replaceable Unit Problem  | 69 | Equipment |
| Real Time Clock Failure | 70 | Equipment |
| Corresponds to a duplicated probable cause; not used | 71-80 |  |
| Protection Mechanism Failure | 81 | Equipment |
| Protecting Resource Failure | 82 | Equipment |
| Reserved for M.3100 potential future extensions. | 83-100 |  |
| Air Compressor Failure | 101 | Environmental |
| Air Conditioning Failure  | 102 | Environmental |
| Air Dryer Failure  | 103 | Environmental |
| Battery Discharging  | 104 | Environmental |
| Battery Failure  | 105 | Environmental |
| Commercial Power Failure  | 106 | Environmental |
| Cooling Fan Failure  | 107 | Environmental |
| Engine Failure  | 108 | Environmental |
| Fire Detector Failure  | 109 | Environmental |
| Fuse Failure  | 110 | Environmental |
| Generator Failure  | 111 | Environmental |
| Low Battery Threshold  | 112 | Environmental |
| Pump Failure  | 113 | Environmental |
| Rectifier Failure  | 114 | Environmental |
| Rectifier High Voltage  | 115 | Environmental |
| Rectifier Low F Voltage  | 116 | Environmental |
| Ventilation System Failure | 117 | Environmental |
| Enclosure Door Open  | 118 | Environmental |
| Explosive Gas  | 119 | Environmental |
| Fire  | 120 | Environmental |
| Flood  | 121 | Environmental |
| High Humidity  | 122 | Environmental |
| High Temperature  | 123 | Environmental |
| High Wind  | 124 | Environmental |
| Ice Build Up  | 125 | Environmental |
| Intrusion Detection  | 126 | Environmental |
| Low Fuel  | 127 | Environmental |
| Low Humidity  | 128 | Environmental |
| Low Cable Pressure  | 129 | Environmental |
| Low Temperature  | 130 | Environmental |
| Low Water  | 131 | Environmental |
| Smoke  | 132 | Environmental |
| Toxic Gas  | 133 | Environmental |
| Reserved for M.3100 potential future extensions. | 137-150 |  |
| Storage Capacity Problem | 151 | Processing Error |
| Memory Mismatch  | 152 | Processing Error |
| Corrupt Data  | 153 | Processing Error |
| Out Of CPU Cycles  | 154 | Processing Error |
| Software Environment Problem  | 155 | Processing Error |
| Software Download Failure | 156 | Processing Error |
| Loss of Real Time | 157 | Processing Error |
| Reinitialized | 158 | Processing Error |
| Corresponds to a duplicated probable cause; not used | 159-167 |  |
| Reserved for M.3100 potential future extensions. | 168-200 |  |
| Corresponds to a duplicated probable cause; not used | 201-202 |  |
| Excessive Error Rate | 203 | Quality of service |
| Corresponds to a duplicated probable cause; not used | 204-207 |  |
| Reserved for M.3100 potential future extensions. | 208-300 |  |

**Table B.2: Probable Causes from ITU-T Recommendation, X.733 [8]**

| **X.733 Probable Cause (string)** | **(integer)** | **Event Type** |
| --- | --- | --- |
| Adapter Error | 301 | Equipment |
| Application Subsystem Failure  | 302 | Processing error |
| Bandwidth Reduction  | 303 | Security Service or Mechanism Violation |
| Corresponds to a duplicated probable cause; not used | 304 |  |
| Communication Protocol Error  | 305 | Communications |
| Communication Subsystem Failure  | 306 | Communications |
| Configuration or Customizing Error  | 307 | Processing error |
| Congestion  | 308 | Quality of service |
| Corresponds to a duplicated probable cause; not used. | 309 |  |
| CPU Cycles Limit Exceeded  | 310 | Processing error |
| Data Set or Modem Error  | 311 | Equipment |
| Corresponds to a duplicated probable cause; not used | 312 |  |
| DTE-DCE Interface Error  | 313 | Communications |
| Corresponds to a duplicated probable cause; not used. | 314 |  |
| Equipment Malfunction  | 315 | Communications |
| Excessive Vibration  | 316 | Integrity Violation |
| File Error  | 317 | Environmental |
| Corresponds to a duplicated probable cause; not used | 318-320 | Equipment |
| Heating or Ventilation or Cooling System Problem | 321 | Environmental |
| Humidity Unacceptable  | 322 | Environmental |
| Input/Output Device Error  | 323 | Equipment |
| Input Device Error  | 324 | Environmental |
| LAN Error | 325 | Processing error |
| Leak Detection  | 326 | Environmental |
| Local Node Transmission Error  | 327 | Communications |
| Corresponds to a duplicated probable cause; not used. | 328-329 |  |
| Material Supply Exhausted  | 330 | Environmental |
| Corresponds to a duplicated probable cause; not used. | 331 |  |
| Out of Memory  | 332 | Processing error |
| Output Device Error  | 333 | Equipment |
| Performance Degraded  | 334 | Quality of service |
| Corresponds to a duplicated probable cause; not used. | 335 |  |
| Pressure Unacceptable  | 336 | Operational Violation |
| Corresponds to a duplicated probable cause; not used. | 337-338 |  |
| Queue Size Exceeded  | 339 | Quality of service |
| Receive Failure  | 340 | Equipment |
| Corresponds to a duplicated probable cause; not used. | 341 |  |
| Remote Node Transmission Error | 342 | Communications |
| Resource at or Nearing Capacity  | 343 | Quality of service |
| Response Time Excessive  | 344 | Quality of service |
| Re-transmission Rate Excessive  | 345 | Quality of service |
| Software Error  | 346 | Processing error |
| Software Program Abnormally Terminated | 347 | Processing error  |
| Software Program Error  | 348 | Processing error |
| Corresponds to a duplicated probable cause; not used. | 349 |  |
| Temperature Unacceptable  | 350 | Environmental |
| Threshold Crossed  | 351 | Quality of service |
| Corresponds to a duplicated probable cause; not used. | 352 |  |
| Toxic Leak Detected  | 353 | Environmental |
| Transmit Failure  | 354 | Equipment |
| Corresponds to a duplicated probable cause; not used. | 355 |  |
| Underlying Resource Unavailable  | 356 | Processing error |
| Version Mismatch  | 357 | Processing error |
| Reserved for potential future extensions | 358-500 |  |

**Table B.3: Probable Causes for Wireless Systems from ETSI TS 101 251 V6.3.0 (1999-07) [3]**

| **Wireless Systems (string)** | **(integer)** | **Event Type** |
| --- | --- | --- |
| A-bis to BTS interface failure | 501 | Equipment |
| A-bis to TRX interface failure | 502 | Equipment |
| Antenna problem | 503 | Equipment |
| Battery breakdown | 504 | Equipment |
| Battery charging fault  | 505 | Equipment |
| Clock synchronization problem | 506 | Equipment |
| Combiner problem  | 507 | Equipment |
| Disk problem | 508 | Equipment |
| Corresponds to a duplicated probable cause; not used. | 509 |  |
| Excessive receiver temperature | 510 | Equipment |
| Excessive transmitter output power | 511 | Equipment |
| Excessive transmitter temperature | 512 | Equipment |
| Frequency hopping degraded | 513 | Equipment |
| Frequency hopping failure | 514 | Equipment |
| Frequency redefinition failed | 515 | Equipment |
| Line interface failure | 516 | Equipment |
| Link failure | 517 | Equipment |
| Loss of synchronization | 518 | Equipment |
| Lost redundancy | 519 | Equipment |
| Mains breakdown with battery back-up | 520 | Equipment |
| Mains breakdown without battery back-up | 521 | Equipment |
| Power supply failure | 522 | Equipment |
| Receiver antenna fault  | 523 | Equipment |
| Corresponds to a duplicated probable cause; not used. | 524 |  |
| Receiver multicoupler failure | 525 | Equipment |
| Reduced transmitter output power | 526 | Equipment |
| Signal quality evaluation fault | 527 | Equipment |
| Timeslot hardware failure | 528 | Equipment |
| Transceiver problem | 529 | Equipment |
| Transcoder problem | 530 | Equipment |
| Transcoder or rate adapter problem  | 531 | Equipment |
| Transmitter antenna failure | 532 | Equipment |
| Transmitter antenna not adjusted | 533 | Equipment |
| Corresponds to a duplicated probable cause; not used. | 534 |  |
| Transmitter low voltage or current | 535 | Equipment |
| Transmitter off frequency | 536 | Equipment |
| Database inconsistency | 537 | Processing error |
| File system call unsuccessful | 538 | Processing error |
| Input parameter out of range | 539 | Processing error |
| Invalid parameter | 540 | Processing error |
| Invalid pointer | 541 | Processing error |
| Message not expected | 542 | Processing error |
| Message not initialized | 543 | Processing error |
| Message out of sequence | 544 | Processing error |
| System call unsuccessful | 545 | Processing error |
| Timeout expired | 546 | Processing error |
| Variable out of range | 547 | Processing error |
| Watch dog timer expired | 548 | Processing error |
| Cooling system failure | 549 | Environmental |
| External equipment failure | 550 | Environmental |
| External power supply failure | 551 | Environmental |
| External transmission device failure | 552 | Environmental |
| Corresponds to a duplicated probable cause; not used. | 553-560 |  |
| Reduced alarm reporting | 561 | Quality of service |
| Reduced event reporting | 562 | Quality of service |
| Reduced logging capability | 563 | Quality of service |
| System resources overload | 564 | Quality of service |
| Broadcast channel failure | 565 | Communications |
| Connection establishment error | 566 | Communications |
| Invalid message received | 567 | Communications |
| Invalid MSU received | 568 | Communications |
| LAPD link protocol failure | 569 | Communications |
| Local alarm indication | 570 | Communications |
| Remote alarm indication | 571 | Communications |
| Routing failure | 572 | Communications |
| SS7 protocol failure | 573 | Communications |
| Transmission error | 574 | Communications |
| Corresponds to a duplicated probable cause; not used. | 575 |  |
| Reserved for potential future extensions | 576-700 |  |

**Table B.4: Probable Causes for Security Alarm from X.736 [13]**

| **Wireless Systems (string)** | **(integer)** |  **Event Type** |
| --- | --- | --- |
| Authentication Failure | 701 | security service or mechanism violation |
| Breach of Confidentiality | 702 | security service or mechanism violation |
| Cable Tamper | 703 | physical violation |
| Delayed Information | 704 | time domain violation |
| Denial of Service  | 705 | operational violation |
| Duplicate Information | 706 | integrity violation |
| Information Missing | 707 | integrity violation |
| Information Modification Detected | 708 | integrity violation |
| Information Out of Sequence | 709 | integrity violation |
| Intrusion Detection | 710 | physical violation |
| Key Expired | 711 | time domain violation |
| Non Repudiation Failure | 712 | security service or mechanism violation |
| Out of Hours Activity | 713 | time domain violation |
| Out of Service | 714 | operational violation |
| Procedural Error | 715 | operational violation |
| Unauthorised Access Attempt | 716 | security service or mechanism violation |
| Unexpected Information | 717 | integrity violation |
| Unspecified Reason | 718 | security service or mechanism violation |
| Reserved for potential future extensions. | 719-800 |  |
|  |

***End of changes***