**3GPP TSG-SA5 Meeting #156 *S5-244631***

**Maastricht, The Netherlands 19 - 23 August 2024**

**Source: AsiaInfo**

**Title:** **Add solution for network congestion analytics based on UE throughput**

**Document for: Approval**

**Agenda Item: 16.9.2**

# 1 Decision/action requested

***In this box give a very clear / short /concise statement of what is wanted.***

# 2 References

[1] 3GPP TR 28.866 v0.2.0 Study on Management Data Analytics (MDA) – Phase 3

# 3 Rationale

This provides the solution for network congestion analytics based on UE throughput

# 4 Detailed proposal

It proposes to make the following changes to TR 28.866.

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| **First Change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 28.104: "Management and orchestration; Management Data Analytics (MDA)".

[3] 3GPP TS 28.532: "Generic management services".

[4] 3GPP TS 23.501: "System architecture for the 5G System (5GS)"

[5] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[6] 3GPP TS 28.554: "Management and orchestration;5G end to end Key Performance Indicators (KPI)".

[7] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[8] 3GPP TS 28.538: " Management and orchestration; Edge Computing Management (ECM)".

[9] 3GPP TS 37.817: "Study on enhancement for data collection for NR and ENDC"

[10] 3GPP TS 38.423: "NG-RAN; Xn Application Protocol (XnAP) "

[11] ITU-T Recommendation X.733 (02/92): "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[12] 3GPP TS 32.422: "Subscriber and equipment trace; Trace control and configuration management"

[13] 3GPP TS 28.541: "5G Network Resource Model (NRM); Stage 2 and stage 3"

[X] 3GPP TS 28.622: "Telecommunication management; Generic Radio Access Network (RAN) Network Resource Model (NRM); Information Service (IS)".

[Y] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

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| **Second Change** |

## 5.6 UE throughput analytics

### 5.6.2 Use case 2: Network congestion analytics based on UE throughput

#### 5.6.2.1 Description

The use case focuses on proactive identification and mitigation of network congestion by analysing UE throughput data.

A surge in user traffic within a specific area, such as a shopping mall, concert venue, or stadium, can lead to network congestion. As user density and data demands increase, cell resources become strained, resulting in a decline in UE throughput. Without timely intervention, congestion intensifies, leading to service degradation and impacting user experience.

The use case leverages MDA to analyse real-time and historical UE throughput performance data to detect and predict congestion. Based on prediction results, the MDA may recommend appropriate mitigation measures (e.g. transfer some UE traffic from congested cells to neighbouring cells with lighter loads) to maintain network performance and ensure user experience.

#### 5.6.2.2 Requirements

REQ-CONG-MDA-01: MDA capability for network congestion analytics based on UE throughput should provide the predict of network congestion for various time granularities (e.g., seconds, minutes, hours) and geographical scopes (e.g., cell, cluster, area).

REQ-CONG-MDA-02: MDA capability for network congestion analytics based on UE throughput should recommend appropriate mitigation measures based on prediction results.

#### 5.6.2.3 Potential solutions

The solution is to introduce the enabling data for network congestion analytics based on UE throughput, the enable data are provided in table 5.6.2.3-1.

**Table 5.6.2.3-1: Enabling data for network congestion analytics based on UE throughput**

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| --- | --- | --- |
| Data category | Description | References |
| Performance measurement | Radio resource utilization | Radio resource utilization as defined in clause 5.1.1.2 in Ts 28.552[5]. |
| RRC connection establishment related measurements | RRC connection establishment related measurements as defined in clause 5.1.1.15 in Ts 28.552[5]. |
| RAN UE Throughput | RAN UE Throughput as defined in clause 6.3.6 in TS 28.554 [6]. |
| UE location reports | UE location information provided by the LMF services which can be used to correlate with the MDT reports. | The UE location information provided by LMF via service-based interface (see TS 23.273 [7]). |
| Configuration data | cellIndividualOffset, isHOAllowed and isMLBAllowed of corresponding NRCellRelation(s). | NRM information TS 28.541 [13]. |
| Geographical data | The geographical information (longitude, latitude, altitude) of the deployed RAN (NG-RAN and E-UTRAN). | The geographical information (longitude, latitude, altitude) information (see the peeParametersList attribute of the ManagedFunction IOC in TS 28.622 [X]). |

The analytics output of MDA for network congestion analytics based on UE throughput, are provided in table table 5.6.2.3-2.

**Table 5.6.2.3-2: Analytics output for network congestion analytics based on UE throughput**

| Information element | Definition | Support qualifier | Properties |
| --- | --- | --- | --- |
| congestionPredicationId | The identifier of the network congestion prediction. | M | type: RecommendedAction  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| congestionPredicationArea | Geographical location areas where the congestion is predicted to occur. | M | type: GeoArea (see TS 28.622 [X])  multiplicity: \*  isOrdered: False  isUnique: True  defaultValue: None  isNullable: False |
| congestionPredicationAffectedCells | The CGIs of cells where the congestion is predicted to occur. | M | type: NRCGI (see TS28.541[Y]) multiplicity: \* isOrdered: False isUnique: True defaultValue: None isNullable: False |
| congestionPredicationStartTime | The predicted start time of the network congestion. | M | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False |
| congestionPredicationEndTime | The predicted end time of the network congestion . | M | type: DateTime multiplicity: 1 isOrdered: N/A isUnique: N/A defaultValue: None isNullable: False |
| congestionRootCause | The root cause of the predicted network congestion issues.  The allowed value is one of the enumerated values: unbalanced load between different cells, frequently handover among several cells, other. | M | type: ENUM  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| congestionPredicationRecommendations | The recommended actions is to mitigate the predicted congestion.  The recommended action may be (but not limited to):  - Load balancing;  - adjusting and configuring the RAN UE throughput related parameters (e.g. cellIndividualOffset, isHOAllowed and isMLBAllowed of corresponding NRCellRelation(s), maximumDeviationHoTrigger of corresponding DMROFunction).scale in a list of NFs. | M | type: String  multiplicity: \* isOrdered: False isUnique: True defaultValue: None isNullable: False |

Note: recommendation for plan from plan management can be considered during normative work.

#### 5.6.2.4 Evaluation of solutions

Only potential solution #1 is proposed, the requirements are satisfied and this solution is feasible for normative work.

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| **Third changes** |

# 6 Conclusions

### 6.x Use case #x: Network congestion analytics based on UE throughput

The use case, requirements and solution for Use case: Network congestion analytics based on UE throughput is described in clause 5.6.2. It is recommended to add new attribute in the MDA analytics output for UE throughput analytics in TS 28.104 [2] to support network congestion prediction information in the analytics output.

The detailed solution is described in clause 5.6.2.3.

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| **End changes** |