**3GPP TSG-CT WG3 Meeting #108eC3-201259**

**E-Meeting, 19th – 28th February 2020**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **29.522** | **CR** | **0139** | **rev** | **1** | **Current version:** | **16.2.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network |  | Core Network | **X** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Supporting the Location services in NEF | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | CATT | | | | | | | | | |
| ***Source to TSG:*** | CT3 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5G\_eLCS | | | | |  | ***Date:*** | | | 2019-12-25 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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 can be 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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | As indicated in subclause 6.5, TS 23.273 v16.2.0, a consumer NF (e.g. AF) in the HPLMN for a target UE may invokes an Nnef\_ProvideLocation Request service operation towards an NEF in the HPLMN to request location information of the target UE.  Moreover, a UE may initiate MO-LR to notify the UE’s location information. After receiving the Location Notification message from H-GMLC, the NEF transfers the location information to the targeted AF by invoking the Nnef\_LocationUpdateNotify service operation.  Lastly, Location reporting by EventExposure service should apply to NEF as well. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Include the Location services in NEF:   1. Add the Nnef\_Location Service in the NF Services provided by NEF; 2. Add the Nnef\_ProvideLocation service operation in the Nef\_Location Service provided by NEF; 3. Add the Nnef\_Location\_LocationUpdateNotify service operation to support the notification of MO-LR location information, 4. Add the EventExposure service to support Location Reporting defined in TS 29.122. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The function of Location Services provided by NEF is missing in stage3. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 4.1, 4.4.z(new), 5.3, 5.x(new), A.y(new) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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 includes a backwards compatible feature to the OpenAPI file | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*The start of changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# 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 23.502: "Procedures for the 5G system".

[3] 3GPP TS 23.501: "System Architecture for the 5G".

[4] 3GPP TS 29.122: "T8 reference point for northbound Application Programming Interfaces (APIs)".

[5] Open API Initiative, "OpenAPI 3.0.0 Specification", <https://github.com/OAI/OpenAPI-Specification/blob/master/versions/3.0.0.md>.

[6] 3GPP TS 33.501: "Security architecture and procedures for 5G System".

[7] 3GPP TS 29.514: "5G System; Policy Authorization Service; Stage 3".

[8] 3GPP TS 29.571: "5G System; Common Data Types for Service Based Interfaces; Stage 3".

[9] 3GPP TS 29.521: "5G System; Binding Support Management Service; Stage 3".

[10] Void.

[11] 3GPP TS 23.222: "Common API Framework for 3GPP Northbound APIs; Stage 2".

[12] 3GPP TS 29.222: "Common API Framework for 3GPP Northbound APIs; Stage 3".

[13] IETF RFC 6749: "The OAuth 2.0 Authorization Framework".

[14] 3GPP TS 33.122: "Security Aspects of Common API Framework for 3GPP Northbound APIs".

[15] Void.

[16] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2".

[17] 3GPP TS 29.503: "5G System; Unified Data Management Services; Stage 3".

[18] 3GPP TS 29.518: "5G System; Access and Mobility Management Services; Stage 3".

[19] 3GPP TS 29.554: "5G System; Background Data Transfer Policy Control Service; Stage 3".

[20] 3GPP TS 29.504: "5G System; Unified Data Repository Services; Stage 3".

[21] 3GPP TR 21.900: "Technical Specification Group working methods".

[22] 3GPP TS 29.523: "5G System; Policy Control Event Exposure Service; Stage 3".

[23] 3GPP TS 29.519: "5G System; Usage of the Unified Data Repository service for Policy Control Data, Application Data and Structured Data for Exposure; Stage 3".

[24] 3GPP TS 29.541: "5G System; Session Management Services for Non-IP Data Delivery (NIDD); Stage 3".

[25] 3GPP TS 29.502: "5G System, Session Management Services; Stage 3".

[26] 3GPP TS 29.508: "5G System; Session Management Event Exposure Service; Stage 3".

[27] 3GPP TS 29.520: "5G System; Network Data Analytics Services; Stage 3".

[28] 3GPP TS 23.316: "Wireless and wireline convergence access support for the 5G system (5GS)".

[29] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[xx] 3GPP TS 29.572: "5G System; Location Management Services; Stage 3".

[yy] 3GPP TS 29.515: "5G System; Gateway Mobile Location Services; Stage 3".

[zz] ITU Recommendation E.164: "The international public telecommunication numbering plan".

[mm] 3GPP TS 23.273: "5G System Location Services (LCS)".

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 4.1 Overview

The NEF Northbound interface is between the NEF and the AF. It specifies RESTful APIs that allow the AF to access the services and capabilities provided by 3GPP network entities and securely exposed by the NEF.

This document also specifies the procedures triggered at the NEF by API requests from the AF and by event notifications received from 3GPP network entities.

The stage 2 level requirements and signalling flows for the NEF Northbound interface are defined in 3GPP TS 23.502 [2].

The NEF Northbound interface supports the following procedures:

1) Procedures for Monitoring

2) Procedures for Device Triggering

3) Procedures for resource management of Background Data Transfer

4) Procedures for CP Parameters, Network Configuration Parameters Provisioning and 5G LAN Parameters Provisioning

5) Procedures for PFD Management

6) Procedures for Traffic Influence

7) Procedures for changing the chargeable party at session set up or during the session

8) Procedures for setting up an AF session with required QoS

9) Procedures for MSISDN-less Mobile Originated SMS

10) Procedures for non-IP data delivery

11) Procedures for analytics information exposure

12) Procedure for applying BDT policy

13) Procedures for Enhanced Coverage Restriction Control

14) Procedures for IPTV Configuration

15) Procedures for Location Services

Which correspond to the following services respectively, supported by the NEF as defined in 3GPP TS 23.502 [2]:

1) Nnef\_EventExposure service and Nnef\_APISupportCapability service

2) Nnef\_Trigger service

3) Nnef\_BDTPNegotiation service

4) Nnef\_ParameterProvision service

5) Nnef\_PFDManagement service

6) Nnef\_TrafficInfluence service

7) Nnef\_ChargeableParty service

8) Nnef\_AFsessionWithQoS service

9) Nnef\_MSISDN-less\_MO\_SMS service

10) Nnef\_NIDDConfiguration and Nnef\_NIDD services

11) Nnef\_AnalyticsExposure service

12) Nnef\_ApplyPolicy service

13) Nnef\_ECRestriction service

14) Nnef\_IPTVConfiguration service

15) Nef\_Location service

NOTE 1: For Nnef\_PFDManagement service, only the Nnef\_PFDManagement\_Create/Update/Delete service operations are applicable for the NEF Northbound interface.

NOTE 2: For Nnef\_NIDD service, NF consumer other than the AF does not use the NEF Northbound interface.

NOTE 3: For Nnef\_NIDDConfiguration service, the Nnef\_NIDDConfiguration\_Trigger service operation is only applicable for the NEF Northbound interface.

NOTE 4: The Nnef\_APISupportCapability service is only applicable in the MonitoringEvent API when the monitoring type sets to "API\_SUPPORT\_CAPABILITY".

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### 4.4.z Procedures for Location Services

#### 4.4.z.1 Location Reporting by Event Exposure Service

The procedures for Monitoring of location reporting as described in subclause 4.4.2 of 3GPP TS 29.122 [4] shall be applicable in 5G with the following differences:

- description of the SCS/AS applies to the AF;

- description of the SCEF applies to the NEF.

#### 4.4.z.2 Location Provisioning by Location Service

##### 4.4.z.2.1 General

The procedure is used by NEF to transfer the UE location information to AF. The following procedure support:

- Notify the AF of the UE’s location information;

##### 4.4.z.2.2 MO Location Update Notification triggered by UE

In order to notify the AF of the UE MO location information received from GMLC, the NEF shall initiate an HTTP POST request to the AF. The body of the HTTP POST message shall include the location information related to UE MO-LR.

Upon receipt of the corresponding HTTP POST message, if the AF cannot handle the location estimate of the UE, e.g. the UE does not register to the AF, the AF shall respond to the NEF with an error code. Otherwise, the AF shall handle the location estimate according to the Service Identity, and send a HTTP response including "204 No Content" status code.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 5.3 Reused APIs

This subclause describes the northbound APIs which are applicable for both EPS and 5GS.

Table 5.3-1: Reused APIs applicable for both EPS and 5GS

|  |  |
| --- | --- |
| API Name | Differences |
| ResourceManagementOfBdt | - The "LocBdt\_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Group\_Id" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may be supported in 5G.  - The "BdtNotification\_5G" feature as described in subclause 5.4.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| PfdManagement | The "FailureLocation\_5G" feature as described in subclause 5.11.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| MonitoringEvent | - The "Number\_of\_UEs\_in\_an\_area\_notification\_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Downlink\_data\_delivery\_status\_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Availability\_after\_DDN\_failure\_notification\_enhancement" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "Location\_notification\_5G" feature as described in subclause 5.3.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| DeviceTriggering |  |
| CpProvisioning | - The "ExpectedUMT\_5G" and "ExpectedUmtTime\_5G" features as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The "ScheduledCommType\_5G" feature as described in subclause 5.10.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| ChargeableParty | - The "EthChgParty\_5G" and "MacAddressRange\_5G" features as described in subclause 5.5.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The events (i.e. LOSS\_OF\_BEARER, RECOVERY\_OF\_BEARER and RELEASE\_OF\_BEARER) do not apply for 5G. |
| AsSessionWithQoS | - The "EthAsSessionQoS\_5G" and "MacAddressRange\_5G" features as described in subclause 5.14.4 of 3GPP TS 29.122 [4] may only be supported in 5G.  - The events (i.e. LOSS\_OF\_BEARER, RECOVERY\_OF\_BEARER and RELEASE\_OF\_BEARER) do not apply for 5G. |
| MsisdnLessMoSms |  |
| NpConfiguration | The "NpExpiry\_5G” feature as described in subclause 5.13.4 of 3GPP TS 29.122 [4] may only be supported in 5G. |
| NIDD |  |
| RacsParameterProvisioning |  |
| ECRControl |  |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

## 5.x MonitoringEvent API

### 5.x.1 Notifications

#### 5.x.1.1 Introduction

Upon receipt of a LocationUpdateNotify from the GMLC, the NEF may send an HTTP POST message in order to notify the AF of the updated UE location procedure.

#### 5.x.1.2 Event Notification

URI: **{notificationUrI}**

The operation shall support the URI variables defined in table 5.x.1.2-1.

Table 5.x.1.2-1: URI variables

|  |  |
| --- | --- |
| Name | Definition |
| notificationDestination | A URI indicating the notification destination where N33 notification requests shall be delivered to.  This URI shall be preconfigured in the NEF. |

#### 5.x.1.3 Operation Definition

##### 5.x.1.3.1 Notification via HTTP POST

This method shall support the request data structures specified in table 5.x.1.3.1-1 and the response data structures and response codes specified in table 5.x.1.3.1-2.

Table 5.x.1.3.1-1: Data structures supported by the POST Request Body on this resource

|  |  |  |  |
| --- | --- | --- | --- |
| Data type | P | Cardinality | Description |
| LocUpdateData | O | 0..1 | The LocUpdateData is only included if the Notification is triggered to deliver UE location to AF during MO-LR procedure |

Table 5.x.1.3.1-2: Data structures supported by the POST Response Body on this resource

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data type | P | Cardinality | Response  codes | Description |
| N/A |  |  | 204 No Content | The notification is received successfully. |
| NOTE: The mandatory HTTP error status codes for the POST method listed in table 5.2.6-1 of 3GPP TS 29.122 [4] also apply. | | | | |

##### 5.x.1.3.2 Notification via Websocket

Not specified in the present specification.

### 5.x.2 Data Model

#### 5.x.2.1 General

This subclause specifies the application data model supported by the LocationService API.

#### 5.x.2.2 Reused data types

The data types reused by the LocationService API from other specifications are listed in table 5.x.2.2-1.

Table 5.x.2.2-1: Re-used Data Types

|  |  |  |
| --- | --- | --- |
| Data type | Reference | Comments |
| SupportedFeatures | 3GPP TS 29.571 [8] | Used to negotiate the applicability of the optional features defined in table 5.x.4-1. |
| Supi | 3GPP TS 29.571 [8] | Subscription Permanent Identifier |
| Gpsi | 3GPP TS 29.571 [8] | Identifies a GPSI. |
| GeographicArea | 3GPP TS 29.572 [xx] | Identifies the geographical information of the user(s). |
| LcsQosClass | 3GPP TS 29.572 [xx] | LCS QoS Class, see clause 4.1b of 3GPP TS 23.273 [19]. |
| AgeOfLocationEstimate | 3GPP TS 29.572 [xx] | Age of the locatin estimate |
| AccuracyFulfilmentIndicator | 3GPP TS 29.572 [xx] | The indication whether the obtained location estimate satisfies the requested accuracy or not |
| PseudonymOfUe | 3GPP TS 29.515 [yy] | Pseudonym of the target UE |
| LocationRequestType | 3GPP TS 29.515 [yy] | event causing the location estimate (5GC-MO-LR) |
| ServiceIdentiy | 3GPP TS 29.515 [yy] | Service identity |

Editor´s note: The location services details in 5G\_eLCS about applicable data for location notification is FFS

#### 5.x.2.3 Structured data types

##### 5.x.2.3.y1 Introduction

This clause defines the structured data types to be used by the LocationService API.

##### 5.x.2.3.y2 Type: LocUpdateData

This type represents the notification data of a MO-LR of a UE from NEF to AF.

Table 5.x.2.3.y2-1: Definition of type LocUpdateData

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Attribute name | Data type | P | Cardinality | Description | Applicability |
| Supi | Supi | O | 0..1 | Subscription Permanent Identifier |  |
| Gpsi | Gpsi | O | 0..1 | Generic Public Subscription identitfier |  |
| pseudonymOfUe | PseudonymOfUe | O | 0..1 | pseudonym of the target UE |  |
| locationRequestType | LocationRequestType | M | 1 | event causing the location estimate (5GC-MO-LR) |  |
| locationEstimate | GeographicArea | M | 1 | geographic area of the target UE |  |
| ageOfLocationEstimate | AgeOfLocationEstimate | M | 1 | age of location estimate |  |
| accuracyFulfilmentIndicator | AccuracyFulfilmentIndicator | M | 1 | the indication whether the obtained location estimate satisfies the requested accuracy or not |  |
| lcsQosClass | LcsQosClass | M | 1 | LCS QoS Class, see clause 4.1b of 3GPP TS 23.273 [mm]. |  |
| serviceIdentity | ServiceIdentity | O | 0..1 | service Identity specified by the UE |  |

#### 5.x.2.4 Simple data types and enumerations

##### 5.x.2.4.1 Introduction

This subclause defines simple data types and enumerations that can be referenced from data structures defined in the previous subclauses.

##### 5.x.2.4.2 Simple data types

The simple data types defined in table 5.x.2.4.2-1 shall be supported.

Table 5.x.2.4.2-1: Simple data types

|  |  |  |  |
| --- | --- | --- | --- |
| Type Name | Type Definition | Description | Applicability |
|  |  |  |  |

### 5.x.3 Used Features

The table below defines the features applicable to the MonitoringEvent API. Those features are negotiated as described in subclause 5.2.7 of 3GPP TS 29.122 [4].

Table 5.x.4-1: Features used by MonitoringEvent API

|  |  |  |
| --- | --- | --- |
| Feature number | Feature Name | Description |
|  |  |  |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Next change\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

# A.y MonitoringEvent API

openapi: 3.0.0

info:

title: 3gpp-location-service

version: 1.0.0.alpha-1

description: |

API for location services.

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externalDocs:

description: 3GPP TS 29.522 V16.3.0; 5G System; Network Exposure Function Northbound APIs.

url: 'http://www.3gpp.org/ftp/Specs/archive/29\_series/29.522/'

security:

- {}

- oAuth2ClientCredentials: []

servers:

- url: '{apiRoot}/3gpp-location-service/v1'

variables:

apiRoot:

default: https://example.com

description: apiRoot as defined in subclause 5.2.4 of 3GPP TS 29.122.

paths:

/location-update-notify:

post:

summary: update UE location notification

tags:

- AF level MO UE location update notify operation

requestBody:

content:

application/json:

schema:

$ref: '#/components/schemas/LocUpdateData'

required: true

responses:

'204':

description: Expected response to successful location context transfer

'400':

$ref: 'TS29122\_CommonData.yaml#/components/responses/400'

'401':

$ref: 'TS29122\_CommonData.yaml#/components/responses/401'

'403':

$ref: 'TS29122\_CommonData.yaml#/components/responses/403'

'404':

$ref: 'TS29122\_CommonData.yaml#/components/responses/404'

'411':

$ref: 'TS29122\_CommonData.yaml#/components/responses/411'

'413':

$ref: 'TS29122\_CommonData.yaml#/components/responses/413'

'415':

$ref: 'TS29122\_CommonData.yaml#/components/responses/415'

'429':

$ref: 'TS29122\_CommonData.yaml#/components/responses/429'

'500':

$ref: 'TS29122\_CommonData.yaml#/components/responses/500'

'503':

$ref: 'TS29122\_CommonData.yaml#/components/responses/503'

'504':

$ref: 'TS29122\_CommonData.yaml#/components/responses/504'

default:

$ref: 'TS29122\_CommonData.yaml#/components/responses/default'

components:

securitySchemes:

oAuth2ClientCredentials:

type: oauth2

flows:

clientCredentials:

tokenUrl: '{nrfApiRoot}/oauth2/token'

scopes:

location-service: Access to the Nnef\_LocationService API

schemas:

#

# COMPLEX TYPES

#

LocUpdateData:

type: object

properties:

gpsi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Gpsi'

supi:

$ref: 'TS29571\_CommonData.yaml#/components/schemas/Supi'

pseudonymOfUe:

$ref: 'TS29515\_Ngmlc\_Location.yaml#/components/schemas/PseudonymOfUe'

locationRequestType:

$ref: 'TS29515\_Ngmlc\_Location.yaml#/components/schemas/LocationRequestType'

locationEstimate:

$ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/GeographicArea'

ageOfLocationEstimate:

$ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/AgeOfLocationEstimate'

accuracyFulfilmentIndicator:

$ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/AccuracyFulfilmentIndicator'

lcsQosClass:

$ref: 'TS29572\_Nlmf\_Location.yaml#/components/schemas/LcsQosClass'

serviceIdentity:

$ref: '#/components/schemas/ServiceIdentity'

required:

- locationRequestType

- locationEstimate

- ageOfLocationEstimate

- accuracyFulfilmentIndicator

- lcsnQosClass

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*End of changes\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*