**3GPP TSG-CT WG1 Meeting #141eC1-23xxxx**

**Online 17– 21 April 2023**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **24.554** | **CR** | **0298** | **rev** | **1** | **Current version:** | **18.0.0** |  |
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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 | **X** | Radio Access Network |  | Core Network | **X** |

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|  |
| ***Title:***  | Timer allocation |
|  |  |
| ***Source to WG:*** | OPPO, Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | 5G\_ProSe\_Ph2 |  | ***Date:*** | 2023-03-22 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-18 |
|  | *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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
|  |  |
| ***Reason for change:*** | This CR is to allocate the timer number.Besides, for the relay discovery for U2U relay discovery from the U2U relay UE to the discoveree end UE, the similar timer with the timer between discoverer end UE and U2U relay UE should also be added. |
|  |  |
| ***Summary of change:*** | Allocate the timer number.Add the timer for relay discovery for U2U relay discovery from the U2U relay UE to the discoveree end UE. |
|  |  |
| ***Consequences if not approved:*** | The timer number are missing. |
|  |  |
| ***Clauses affected:*** | 5.3.2.1, 5.3.2.3, 7.2.13.2, 7.2.13.4, 7.2.13.5, 7.2.13.6.1, 7.7.3.2, 7.7.3.4, 7.7.3.6.1, 8a.2.1.3.2.2, 8a.2.1.3.3.2, 12.2, 12.3, 12.11(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's revision history:*** |  |

\* \* \* First Change \* \* \* \*

#### 5.3.2.1 General

The UE-requested ProSeP policy provisioning procedure enables the UE to request ProSeP from the PCF in the following cases:

a) if the T5051 for a UE policies for 5G ProSe direct discovery expires;

b) if the T5052 for a UE policies for 5G ProSe direct communications expires;

c) if the T5053 for a UE policies for 5G ProSe UE-to-network relay UE expires;

d) if the T5054 for UE policies for 5G ProSe remote UE expires;

e) if the T5057 for UE policies for 5G ProSe usage information reporting expires;

f) if the T5058 for a UE policies for 5G ProSe UE-to-UE relay UE expires;

g) if the T5059 for a UE policies for 5G ProSe end UE expires; and

h) if there are no valid configuration parameters, e.g., for the current area, or due to abnormal situation.

The UE shall follow the principles of PTI handling for UE policy delivery service procedures defined in 3GPP TS 24.501 [11] clause D.1.2.

\* \* \* Next Change \* \* \* \*

#### 5.3.2.3 UE-requested ProSeP policy provisioning procedure accepted by the network

Handling in 3GPP TS 24.587 [18] clause 5.3.2.3 shall apply.

If new UE policies for 5G ProSe direct discovery are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5051 if it is running and start timer T5051 with the value included in the UE policies for 5G ProSe direct discovery and start using the new UE policies for 5G ProSe direct discovery included in the MANAGE UE POLICY COMMAND message.

If new UE policies for 5G ProSe direct communications are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5052 if it is running and start timer T5052 with the value included in the UE policies for 5G ProSe direct communications and start using the new UE policies for 5G ProSe direct communications included in the MANAGE UE POLICY COMMAND message.

If new UE policies for 5G ProSe UE-to-network relay UE are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5053 if it is running and start timer T5053 with the value included in the UE policies for 5G ProSe UE-to-network relay UE and start using the new UE policies for 5G ProSe UE-to-network relay UE included in the MANAGE UE POLICY COMMAND message. If the security related parameters for discovery are included in the new UE policies for 5G ProSe UE-to-network relay UE in the MANAGE UE POLICY COMMAND message and the security procedure over control plane as specified in 3GPP TS 33.503 [34] is used, the UE shall stop timer T5056 if it is running and start timer T5056 with the value included in the security related parameters for discovery, and start using the security related parameters for discovery included in the new UE policies for 5G ProSe UE-to-network relay UE.

If new UE policies for 5G ProSe remote UE are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5054 if it is running and start timer T5054 with the value included in the UE policies for 5G ProSe remote UE and start using the new UE policies for 5G ProSe remote UE included in the MANAGE UE POLICY COMMAND message. If the security related parameters for discovery are included in the new UE policies for 5G ProSe remote UE in the MANAGE UE POLICY COMMAND message and the security procedure over control plane as specified in 3GPP TS 33.503 [34] is used, the UE shall stop timer T5056 if it is running and start timer T5056 with the value included in the security related parameters for discovery, and start using the security related parameters for discovery included in the new UE policies for 5G ProSe remote UE.

If new UE policies for 5G ProSe usage information reporting are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5057 if it is running and start timer T5057 with the value included in the UE policies for 5G ProSe usage information reporting, and start using the UE policies for 5G ProSe usage information reporting included in the MANAGE UE POLICY COMMAND message.

If new UE policies for 5G ProSe UE-to-UE relay UE are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5058 if it is running and start timer T5058 with the value included in the UE policies for 5G ProSe UE-to-UE relay UE and start using the new UE policies for 5G ProSe UE-to-UE relay UE included in the MANAGE UE POLICY COMMAND message.

If new UE policies for 5G ProSe end UE are included in the MANAGE UE POLICY COMMAND message, the UE shall stop timer T5059 if it is running and start timer T5059 with the value included in the UE policies for 5G ProSe end UE and start using the new UE policies for 5G ProSe end UE included in the MANAGE UE POLICY COMMAND message.

\* \* \* Next Change \* \* \* \*

#### 7.2.13.2 5G ProSe direct relay update procedure initiation by initiating UE

The 5G ProSe layer-3 UE-to-UE relay UE shall initiate the 5G ProSe direct relay update procedure with the target UE, if:

a) the 5G ProSe layer-3 UE-to-UE relay UE receives a PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message from the initiating end UE as part of 5G ProSe direct link identifier update procedure; and

b) the “peer update” indication is included in the PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message.

The 5G ProSe layer-3 UE-to UE relay UE retrieves the target UEs’ (e.g., target end UEs’) entry from its local table based on the target end UE(s) info received on the PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message. The 5G ProSe layer-3 UE-to UE relay UE initiates the 5G ProSe relay update procedure with every target UE.

In order to initiate the 5G ProSe direct relay update procedure, the 5G ProSe layer-3 UE-to-UE relay UE shall create a PROSE UE TO UE RELAY UPDATE REQUEST message. In this message, the 5G ProSe layer-3 UE-to-UE relay UE;

1. shall include the initiating end UE’s old IP address/prefix;
2. may include the initiating end UE’s old application layer ID;
3. may include the initiating end UE’s new application layer ID; and
4. shall include the initiating end UE’s new IP address/prefix.

The 5G ProSe layer-3 UE-to-UE relay UE shall pass this message to the lower layers for transmission along with the target UE's layer-2 ID for 5G ProSe direct communication and start timer T5095. The 5G ProSe layer-3 UE-to-UE relay UE shall not send a new PROSE UE TO UE RELAY UPDATE REQUEST message to the same target UE while timer T5095 is running.



Figure 7.2.13.2.1: 5G ProSe direct relay update procedure

\* \* \* Next Change \* \* \* \*

#### 7.2.13.4 5G ProSe direct link authentication procedure completion by the initiating UE

Upon receiving a PROSE UE TO UE RELAY UPDATE ACCEPT message, if the initiating UE (i.e. 5G ProSe layer-3 UE-to UE relay UE) determines that the PROSE UE TO UE RELAY UPDATE ACCEPT message can be accepted, the initiating UE shall stop timer T5095.

If more than one target end UE is included on the received PROSE UE TO UE RELAY UPDATE REQUEST message, the 5G ProSe layer-3 relay UE may wait for the responses from all target UEs before stopping timer Txxxx.

\* \* \* Next Change \* \* \* \*

#### 7.2.13.5 5G ProSe direct relay update procedure not accepted by the target UE

If the PROSE UE TO UE RELAY UPDATE REQUEST message cannot be accepted, the target UE shall create a PROSE DIRECT RELAY UPDATE REJECT message. In this message, the target UE shall include a PC5 signalling protocol cause IE indicating one of the following cause values:

#x: unknown initiating end UE’s IP address/prefix or initiating UE’s Application layer ID;

After the PROSE DIRECT RELAY UPDATE REJECT message is generated, the target UE shall pass this message to the lower layers for transmission along with 5G ProSe layer-3 UE-to-UE Relay UE’s layer-2 ID for unicast communication and the target UE's layer-2 ID for unicast communication.

Upon receipt of the PROSE DIRECT RELAY UPDATE REJECT message, the initiating UE shall stop timer T5095 and shall continue the ongoing procedure that triggered the initiation of the 5G ProSe direct relay update procedure indicating the failing target UE(s) to the initiating end UE as specified in clause 7.2.4.6.

\* \* \* Next Change \* \* \* \*

##### 7.2.13.6.1 Abnormal cases at the initiating UE

a) Timer T5095 expires.

 The initiating UE shall retransmit the PROSE UE TO UE RELAY UPDATE REQUEST message and restart timer T5095. After reaching the maximum number of allowed retransmissions, the initiating UE shall abort the 5G ProSe direct relay update procedure and shall continue the ongoing procedure that triggered the initiation of the 5G ProSe direct relay update procedure indicating the failing target end UE(s) to the initiating end UE as specified in clause 7.2.4.6.

NOTE 1: The maximum number of allowed retransmissions is UE implementation specific.

\* \* \* Next Change \* \* \* \*

#### 7.7.3.2 Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu initiation by initiating UE

The initiating UE shall meet the following pre-conditions before initiating this procedure for switching the direct communication path over PC5 to the direct communication path over Uu:

a) the initiating UE and the target UE are communicating with each other via the 5G ProSe direct link over PC5 reference point; and

b) the communication mode of the 5G ProSe direct link is set to unicast mode.

In order to initiate the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu, the initiating UE shall create a PROSE PATH SWITCHING REQUEST message. In the PROSE PATH SWITCHING REQUEST message, the initiating UE:

a) shall include the required ProSe identifiers set to the ProSe identifier(s) of the authorized ProSe application(s) for which the communication path switching procedure is to be performed according to the ProSe application to path switching mapping rules as specified in clause 5.2.4; and

b) may include the Uu QoS flow descriptions set to the requested QoS flow description for each ProSe identifier to be used in the communication path over Uu.

NOTE 1: The initiating UE derives the requested QoS flow description(s) based on the PC5 QoS parameters of the PC5 QoS flow(s) between the initiating UE and the target UE.

After the PROSE PATH SWITCHING REQUEST message is generated, the initiating UE shall pass this message to the lower layers for transmission along with the source layer-2 ID and destination layer-2 ID used in the existing 5G ProSe direct link with the target UE and start timer T5094. The initiating UE shall not send a new PROSE PATH SWITCHING REQUEST message to the same target UE while timer T5094 is running.



Figure 7.7.3.2.1: Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu

Upon receipt of the PROSE PATH SWITCHING REQUEST message, the target UE:

a) may perform either of the following:

1) initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1 of 3GPP TS 24.501 [11] to establish a PDU session to be used for the direct communication path over Uu; or

2) initiate the UE-requested PDU session modification procedure as specified in clause 6.4.2 of 3GPP TS 24.501 [11] to modify a PDU session to be used for the direct communication path over Uu with the Requested QoS flow descriptions IE set to the QoS flow descriptions received in the PROSE PATH SWITCHING REQUEST message; and

Editor's note: It is FFS whether the UE needs to perform UE-requested PDU session establishment/modification procedure before accept the PROSE PATH SWITCHING REQUEST message.

b) shall determine if there are at least one ProSe application(s) that are able to perform the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu in the PROSE PATH SWITCHING REQUEST message with the following considerations:

1) the ProSe application(s) that are not authorized to perform communication path switching procedure according to the ProSe application to path switching mapping rules as specified in clause 5.2.4 shall not be considered as be able to perform the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu; and

2) other criteria (e.g. availability of direct communication path over Uu, result of bullet a), etc.) may be taken into consideration in addition to the ProSe application to path switching mapping rules as specified in clause 5.2.4.

NOTE 2: What other criteria are considered in the target UE side is left to UE implementations.

Editor's Note: It is FFS how to support the notification of UE when it cannot perform path switch.

\* \* \* Next Change \* \* \* \*

#### 7.7.3.4 Path switching procedure from the direct communication path over PC5 to the direct communication path over Uu completion by the initiating UE

Upon receipt of the PROSE PATH SWITCHING ACCEPT message, the initiating UE:

a) shall stop timer T5094; and

b) may perform either of the following:

1) initiate the UE-requested PDU session establishment procedure as specified in clause 6.4.1 of 3GPP TS 24.501 [11] to establish a PDU session to be used for the direct communication path over Uu; or

2) initiate the UE-requested PDU session modification procedure as specified in clause 6.4.2 of 3GPP TS 24.501 [11] to modify a PDU session to be used for the direct communication path over Uu with the Requested QoS flow descriptions IE set to the QoS flow descriptions sent in the PROSE PATH SWITCHING REQUEST message.

The initiating UE shall then transmit the data traffic of the negotiated ProSe application(s) for which the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu with the target UE using the direct communication path over Uu is performed.

Editor's note: It is FFS how to handle the ProSe application(s) that are not included in the negotiated ProSe identifier(s) (i.e. ProSe application(s) that are not acceptable for the target UE to be switched in the path switching procedure).

When the data traffic is successfully transmitted, the initiating UE or the target UE may initiate a 5G ProSe direct link release procedure as specified in clause 7.2.6 if there are no more ProSe applications over the existing 5G ProSe direct link between the initiating UE and the target UE.

NOTE: The UE is allowed to maintain the existing 5G ProSe direct link in order to e.g. switch back from the direct communication path over Uu after the completion of the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu.

\* \* \* Next Change \* \* \* \*

##### 7.7.3.6.1 Abnormal cases at the initiating UE

The following abnormal cases can be identified:

a) Expiry of timer T5aaa:

 On the first expiry of the timer T5094, the UE shall resend the PROSE PATH SWITCHING REQUEST message and shall reset and restart timer T5094. This retransmission is repeated two times, i.e. on the third expiry of timer T5094, the UE shall abort the procedure and consider the target UE is not in proximity or the path switching procedure from the direct communication path over PC5 to the direct communication path over Uu is not accepted by the target UE.

\* \* \* Next Change \* \* \* \*

###### 8a.2.1.3.2.2 Discoverer end UE procedure for UE-to-UE relay discovery initiation

The UE is authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery if:

a) one of the following is true:

1) the UE is not served by NG-RAN, is authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE and is configured with the radio parameters to be used for ProSe UE-to-UE relay discovery when not served by NG-RAN;

2) the UE is served by NG-RAN, is authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE; or

3) the UE is:

i) in 5GMM-IDLE mode, in limited service state as specified in 3GPP TS 23.122 [14] and the reason for the UE being in limited service state is one of the following:

A) the UE is unable to find a suitable cell in the selected PLMN as specified in 3GPP TS 38.304 [15];

B) the UE received a REGISTRATION REJECT message or a SERVICE REJECT message with the 5GMM cause #11 "PLMN not allowed" as specified in 3GPP TS 24.501 [11]; or

C) the UE received a REGISTRATION REJECT message or a SERVICE REJECT message with the 5GMM cause #7 "5GS services not allowed" as specified in 3GPP TS 24.501 [11]; and

Editor's note: The UE behavior in limited service state needs to be revisited, which will be determined by SA2.

ii) authorised to act as a 5G ProSe end UE towards a 5G ProSe UE-to-UE relay UE when the UE is not served by NG-RAN and configured with the radio parameters to be used for ProSe UE-to-UE relay discovery use when not served by NG-RAN;

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service provided by a UE-to-UE relay to be solicited; and

Editor's note: The security related contents are FFS and depend on SA3 requirements.

2) the User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x.

otherwise, the UE is not authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery.

Figure 8a.2.1.3.2.2.1 illustrates the interaction of the UEs in the discoverer end UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.2.2.1: Discoverer end UE procedure for UE-to-UE Relay discovery

For PROSE PC5 DISCOVERY message signal strength measurement, the UE manages a periodic measurement timer T5111, which is used to trigger the periodic PROSE PC5 DISCOVERY message signal strength measurement between the UE and the ProSe UE-to-UE relay UE with which the UE has a link established. It is started whenever the UE has established a direct link with a 5G ProSe UE-to-UE relay UE and restarted whenever the UE receives the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response from the 5G ProSe UE-to-UE relay UE with which the UE has a link established.

When the UE is triggered by the upper layers to solicit proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE, or when the periodic measurement timer T5111 expires and if the UE is authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery, then the UE:

a) if the UE is served by NG-RAN and the UE in 5GMM-IDLE mode needs to request resources for sending PROSE PC5 DISCOVERY messages for relay discovery as specified in 3GPP TS 38.331 [13], shall perform a service request procedure as specified in 3GPP TS 24.501 [11];

b) shall obtain a valid UTC time for the discovery transmission from the lower layers and generate the UTC-based counter corresponding to this UTC time;

c) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation. In the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, the UE:

1) shall set the source discoverer end UE info parameter to the configured User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x;

2) shall set the relay service code parameter to the relay service code parameter identifying the connectivity service to be solicited, configured in clause 5.2.x.

3) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];4) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter;

5) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.13;

6) may include the target discoveree end UE info parameter set to the user info ID of the targeted discoveree end UE if the user info ID of the targeted discoveree end UE is provided by the upper layers; and

7) may set the UE-to-UE relay UE info parameter to user info ID for the UE-to-UE relay UE, if known e.g. during previous 5G ProSe UE-to-UE relay discovery or 5G ProSe UE-to-UE relay communication procedure(s);

d) shall set the destination layer-2 ID to the default destination layer-2 ID as specified in clause 5.2.x and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery solicitation message; and

NOTE 2: The UE implementation ensures that the value of the self-assigned source layer-2 ID is different from any other self-assigned source layer-2 ID(s) in use for 5G ProSe direct communication as specified in clause 7.2, is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2 and is different from any other self-assigned source layer-2 ID in use for a simultaneous 5G ProSe direct discovery procedure over PC5 with a different discovery model as specified in clause 6.2.14.2.1.2, clause 6.2.15.2.1.2, clause 8.2.1.2.2.2, clause 8.2.1.2.4.2 and clause 8a.2.1.2.2.2.

e) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation along with the source layer-2 ID, destination layer-2 ID and an indication that the message is for 5G ProSe direct discovery to the lower layers for transmission over the PC5 interface.

Editor's note: The security related contents are FFS and depend on SA3 requirements.

If the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is used to solicit proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE, the UE shall ensure that it keeps on passing the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation for transmission until the UE is triggered by the upper layers to stop soliciting proximity of a connectivity service provided by a 5G ProSe UE-to-UE relay UE, or until the UE stops being authorised to perform the discoverer end UE procedure for UE-to-UE relay discovery. How this is achieved is left up to UE implementation.

NOTE 3: The discoverer end UE can stop discoverer end UE procedure for UE-to-UE relay discovery for power saving by implementation specific means e.g. an implementation-specific maximum number of 5G ProSe direct links configured in the UE, or an implementation-specific timer expires.

If the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the UE and the 5G ProSe UE-to-UE Relay UE with which the UE has a link established, the UE shall start the retransmission timer T5110. If retransmission timer T5110 expires, the UE shall retransmit the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and restart timer T5110. If no response is received from the ProSe UE-to-UE relay UE with which the UE has a link established after reaching the maximum number of allowed retransmissions, the UE shall trigger relay reselection procedure.

NOTE 4: The maximum number of allowed retransmissions is UE implementation specific.

NOTE 5: The UE can determine the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is for 5G ProSe direct discovery based on an indication from the lower layer.

Then if:

a) the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation; and

b) the user info ID of target discoveree end UE is not provided by upper layers for the connectivity service being solicited, or the target discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the user info ID of targeted discoveree end UE if the user info ID of targeted discoveree end UE is provided by upper layers for the connectivity service being solicited,

then the UE shall consider that the connectivity service the UE seeks to discover has been discovered. In addition, the UE can measure the signal strength of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response for relay selection or reselection. If the UE has received the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response from the ProSe UE-to-UE Relay UE with which the UE has a link established, the UE shall stop the retransmission timer T5110 and start the periodic measurement timer T5111.

\* \* \* Next Change \* \* \* \*

###### 8a.2.1.3.3.2 Relay UE procedure for UE-to-UE relay discovery initiation

The UE is authorised to perform the relay UE procedure for UE-to-UE relay discovery if:

a) the UE is authorised to act as a 5G ProSe UE-to-UE relay UE in the PLMN indicated by the serving cell, and

1) the UE is served by NG-RAN; or

2) the UE is not served by NG-RAN and intends to use the provisioned radio resources for UE-to-UE relay discovery;

b) the UE is configured with:

1) the relay service code parameter identifying the connectivity service to be responded to as specified in clause 5.2.x; and

2) the User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x.

otherwise, the UE is not authorised to perform the relay UE procedure for UE-to-UE relay discovery.

 with the discoveree end UE

When the UE is triggered by the upper layers to start responding to solicitation on proximity of a connectivity service provided by the UE-to-UE relay and if the UE is authorised to perform the relay UE procedure for UE-to-UE relay discovery, then the UE:

a) if the UE is served by NG-RAN and the UE in 5GMM-IDLE mode needs to request resources for sending PROSE PC5 DISCOVERY messages as specified in 3GPP TS 38.331 [13], shall perform a service request procedure as specified in 3GPP TS 24.501 [11]; and

b) shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages.

Editor's note: The security related contents are FFS and depend on SA3 requirements.

NOTE 1: The UE can determine the received PROSE PC5 DISCOVERY message for 5G ProSe direct discovery solicitation is for 5G ProSe direct discovery based on an indication from the lower layer.

Then, if:

a) the relay service code parameter of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is the same as the relay service code parameter configured as specified in clause 5.2.x for the connectivity service; or

b) when the periodic measurement timer T5113 expires;

then the UE:

a) shall obtain a valid UTC time for the discovery transmission from the lower layers and generate the UTC-based counter corresponding to this UTC time;

b) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation to the discoveree end UE. In the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, the UE:

1) shall set the source discoverer end UE info parameter to the source discoverer end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE;

2) shall set the UE-to-UE relay UE info parameter to the configured User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x;

3) shall set the relay service code parameter to the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE;

4) shall set the Resource Status Indicator bit of the status indicator parameter to indicate whether or not the UE has resources available to provide a connectivity service for additional ProSe-enabled UEs;

5) may include the target discoveree end UE info parameter, if the target discoveree end UE info parameter is included in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the discoverer end UE;

6) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];7) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter;

8) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.14;

c) shall set the destination layer-2 ID to the default destination layer-2 ID as specified in clause 5.2.x and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery response message; and

NOTE 2: The UE implementation ensures that the value of the self-assigned source layer-2 ID is different from any other self-assigned source layer-2 ID(s) in use for 5G ProSe direct communication as specified in clause 7.2 and is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2.

d) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation along with the source layer-2 ID, destination layer-2 ID and an indication that the message is for 5G ProSe direct discovery to the lower layers for transmission over the PC5 interface.

Editor's note: The security related contents are FFS and depend on SA3 requirements.

For PROSE PC5 DISCOVERY message signal strength measurement, the UE manages a periodic measurement timer T5113, which is used to trigger the periodic PROSE PC5 DISCOVERY message signal strength measurement between the UE and the discoveree end UE with which the UE has a link established. It is started whenever the UE has established a direct link with a discoveree end UE and restarted whenever the UE receives the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response from the discoveree end UE with which the UE has a link established.

If the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation is used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the UE and the discoveree end UE with which the UE has a link established, the UE shall start the retransmission timer T5112. If retransmission timer T5112 expires, the UE shall retransmit the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and restart timer T5112. If no response is received from the discoveree end UE with which the UE has a link established after reaching the maximum number of allowed retransmissions, the UE shall trigger the 5G ProSe direct link release procedure.

NOTE 2: The maximum number of allowed retransmissions is UE implementation specific.

The UE shall instruct the lower layers to start monitoring for PROSE PC5 DISCOVERY messages for UE-to-UE relay discovery response from the discoveree end UE.

If:

a) the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation; and

b) the target discoveree end UE info is not provided by the discoverer end UE for the connectivity service being solicited, or the discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response is the same as the target discoveree end UE info if the target discoveree end UE info parameter is included in the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation,

then the UE:

a) shall obtain a valid UTC time for the discovery transmission from the lower layers and generate the UTC-based counter corresponding to this UTC time;

b) shall generate a PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response. In the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response, the UE:

1) shall set the target discoveree end UE info parameter to the target discoveree end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response received from the discoveree end UE;

2) shall set the UE-to-UE relay UE info parameter to the configured User info ID for the UE-to-UE relay discovery parameter, as specified in clause 5.2.x;

3) shall set the source discoverer end UE info parameter to the source discoverer end UE info parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation received from the 5G ProSe UE-to-UE relay UE;

4) shall set the relay service code parameter to the relay service code parameter of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response received from the discoveree end UE;

5) shall set the Resource Status Indicator bit of the status indicator parameter to indicate whether or not the UE has resources available to provide a connectivity service for additional ProSe-enabled UEs;

6) shall include the MIC filed computed as described in 3GPP TS 33.503 [34];7) shall set the UTC-based counter LSB parameter to the 4 least significant bits of the UTC-based counter; and8) shall set the ProSe direct discovery PC5 message type parameter as specified in table 10.2.1.14;

c) shall set the destination layer-2 ID to the source layer-2 ID from the discoverer end UE used in the transportation of the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation and self-assign a source layer-2 ID for sending the UE-to-UE relay discovery response message; and

NOTE 3: The UE implementation ensures that the value of the self-assigned source layer-2 ID is different from any other self-assigned source layer-2 ID(s) in use for 5G ProSe direct communication as specified in clause 7.2 and is different from any other provisioned destination layer-2 ID(s) as specified in clause 5.2.

d) shall pass the resulting PROSE PC5 DISCOVERY message for UE-to-UE relay discovery response along with the source layer-2 ID, destination layer-2 ID and an indication that the message is for 5G ProSe direct discovery to the lower layers for transmission over the PC5 interface.

NOTE 4: If the UE is processing a PROSE DIRECT LINK ESTABLISHMENT REQUEST message from the same source layer-2 ID of the received PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation, it depends on UE implementation to avoid the conflict of destination layer-2 ID (e.g. send a PROSE DIRECT LINK ESTABLISHMENT REJECT message containing PC5 signalling protocol cause value #3 "conflict of layer-2 ID for unicast communication is detected", or ignore the PROSE DIRECT DISCOVERY message for UE-to-UE relay discovery solicitation).

Editor's note: The security related contents are FFS and depend on SA3 requirements.

Figure 8a.2.1.3.3.2.2 illustrates the interactions between the 5G ProSe UE-to-UE relay UE and discoverer end UE in the relay UE procedure for UE-to-UE relay discovery.



Figure 8a.2.1.3.3.2.2: Relay UE procedure with the discoverer end UE for UE-to-UE Relay discovery

\* \* \* Next Change \* \* \* \*

## 12.2 Timers of provisioning of parameters for 5G ProSe configuration procedures

Timers of provisioning of parameters for 5G ProSe configuration are shown in table 12.2.1.

NOTE: Timer T5040 is defined in 3GPP TS 24.587 [18].

Table 12.2.1: Timers of provisioning of parameters for 5G ProSe configuration – UE side

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ONEXPIRY |
| --- | --- | --- | --- | --- |
| T5051 | Validity timer value for UE policies for 5G ProSe direct discovery over PC5 (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.3. | Start using the new UE policies for 5G ProSe direct discovery received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe direct discovery | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5052 | Validity timer value for UE policies for 5G ProSe direct communication over PC5 (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.4. | Start using the new UE policies for 5G ProSe direct communications received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe direct communications | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5053 | Validity timer value for UE policies for 5G ProSe UE-to-network relay UE (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.5. | Start using the new UE policies for 5G ProSe UE-to-network relay received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe UE-to-network relay | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5054 | Validity timer value for UE policies for 5G ProSe remote UE (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.6. | Start using the new UE policies for 5G ProSe Remote UE received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe Remote UE | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5055 | Validity timer value for the security related parameters at the 5G ProSe UE-to-network relay UE, used for UE-to-network relay discovery when the security procedure over control plane as specified in 3GPP TS 33.503 [34] is used (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.5. | Start using the security related parameters for discovery in the new UE policies for 5G ProSe UE-to-network relay UE received in MANAGE UE POLICY COMMAND message | Stop using the security related parameters for discovery in the old UE policies for 5G ProSe UE-to-network relay UE | Consider the existing configured security related parameters for discovery as invalid |
| T5056 | Validity timer value for the security related parameters at the 5G ProSe remote UE, used for UE-to-network relay discovery when the security procedure over control plane as specified in 3GPP TS 33.503 [34] is used (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.6. | Start using the security related parameters for discovery in the new UE policies for 5G ProSe remote UE received in MANAGE UE POLICY COMMAND message | Stop using the security related parameters for discovery in the old UE policies for 5G ProSe remote UE | Consider the existing configured security related parameters for discovery as invalid |
| T5057 | Validity timer value for UE policies for 5G ProSe usage information reporting (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.7. | Start using the new UE policies for 5G ProSe usage information reporting received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe usage information reporting | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5058 | Validity timer value for UE policies for 5G ProSe UE-to-UE relay UE (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.8. | Start using the new UE policies for 5G ProSe UE-to-UE relay UE received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe UE-to-UE relay UE | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| T5059 | Validity timer value for UE policies for 5G ProSe end UE (see clause 5.2), which is specified in 3GPP TS 24.555 [17] clause 5.9. | Start using the new UE policies for 5G ProSe end UE received in MANAGE UE POLICY COMMAND message | Stop using the old UE policies for 5G ProSe end UE | Initiate the UE-requested ProSeP provisioning procedure(NOTE 1) |
| NOTE 1: The timers expire only once. |

\* \* \* Next Change \* \* \* \*

## 12.3 Timers of 5G ProSe direct link management procedures

NOTE: Timer T3346 is defined in 3GPP TS 24.008 [31].

Table 12.3.1: 5G ProSe direct link management timers

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ONEXPIRY |
| --- | --- | --- | --- | --- |
| T5080 | 8sNOTE 1 | Upon sending a PROSE DIRECT LINK ESTABLISHMENT REQUEST message | Upon receiving a PROSE DIRECT LINK ESTABLISHMENT ACCEPT or PROSE DIRECT LINK ESTABLISHMENT REJECT message from the target UE if the Target user info is included in the PROSE DIRECT LINK ESTABLISHMENT REQUEST message | Retransmission of PROSE DIRECT LINK ESTABLISHMENT REQUEST message if the Target user info is included in the PROSE DIRECT LINK ESTABLISHMENT REQUEST message; ormay abort the ongoing procedure if the Target user info is not included in the PROSE DIRECT LINK ESTABLISHMENT REQUEST message |
| T5081 | 5s | Upon sending a PROSE DIRECT LINK MODIFICATION REQUEST message | Upon receiving a PROSE DIRECT LINK MODIFICATION ACCEPT or PROSE DIRECT LINK MODIFICATION REJECT or PROSE DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of PROSE DIRECT LINK MODIFICATION REQUEST message |
| T5082 | 2s | Upon sending a PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message | Upon receiving a PROSE DIRECT LINK IDENTIFIER UPDATE ACCEPT or PROSE DIRECT LINK IDENTIFIER UPDATE REJECT or PROSE DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of the PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message |
| T5083 | 2s | Upon sending a PROSE DIRECT LINK IDENTIFIER UPDATE ACCEPT message | Upon receiving a PROSE DIRECT LINK IDENTIFIER UPDATE ACK message or PROSE DIRECT LINK RELEASE REQUEST message from the initiating UE | Retransmission of the PROSE DIRECT LINK IDENTIFIER UPDATE ACCEPT message  |
| T5084 | 5s | Upon receiving a PC5 signalling message or PC5 user plane data | Upon 5G ProSe direct link release or upon initiating the 5G ProSe direct link keep-alive procedure | Initiate the 5G ProSe direct link keep-alive procedure |
| T5085 | 5s | Upon sending a PROSE DIRECT LINK KEEPALIVE REQUEST message | Upon receiving a PC5 signalling message or PC5 user plane data | Retransmission of the PROSE DIRECT LINK KEEPALIVE REQUEST message |
| T5086 | Default 10mNOTE 2 | Upon receiving a Maximum inactivity period in a PROSE DIRECT LINK KEEPALIVE REQUEST message, receiving a PC5 signalling message or receiving PC5 user plane data | Upon receiving a PC5 signalling message or PC5 user plane data | Either initiate the 5G ProSe direct link keep-alive procedure or the 5G ProSe direct link release procedure |
| T5087 | 5s | Upon sending a PROSE DIRECT LINK RELEASE REQUEST message | Upon receiving a PROSE DIRECT LINK RELEASE ACCEPT message from the target UE | Retransmission of PROSE DIRECT LINK RELEASE REQUEST message |
| T5088 | As described in clause 7.2.2.5 and clause 7.2.6.3 | Upon receiving a PROSE DIRECT LINK ESTABLISHMENT REJECT message with PC5 signalling protocol cause value set to #13 "congestion situation" and a back-off timer value is provided in the messageUpon receiving a PROSE DIRECT LINK RELEASE REQUEST message with PC5 signalling protocol cause value set to #13 "congestion situation" and a back-off timer value is provided in the message | Upon receiving PROSE PC5 DISCOVERY message from the same UE-to-network relay UE due to starting announcing UE procedure or discoveree UE procedure as described in clause 8.2.1.2.1.2 and clause 8.2.1.3.2.2 respectively | Take the peer UE onboard for UE-to-network relay UE discovery and selection |
| T5089 | 2s | Upon sending a PROSE DIRECT LINK SECURITY MODE COMMAND message | Upon receiving a PROSE DIRECT LINK SECURITY MODE COMPLETE or PROSE DIRECT LINK SECURITY MODE REJECT message from the target UE | Retransmission of PROSE DIRECT LINK SECURITY MODE COMMAND message |
| T5090 | NOTE 2 | Upon establishing a 5G ProSe direct link and satisfying the privacy requirement for 5G UE-to-network relay or at least one of ProSe identifiers for the 5G ProSe direct link satisfying the privacy requirements orupon completing the 5G ProSe direct link identifier update procedure | Upon completing a 5G ProSe direct link identifier update orupon accepting a PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message orupon a 5G ProSe direct link release  | Transmission of PROSE DIRECT LINK IDENTIFIER UPDATE REQUEST message |
| T5091 | 8s | Upon sending a PROSE DIRECT LINK REKEYING REQUEST message | Upon receiving a PROSE DIRECT LINK REKEYING RESPONSE message or PROSE DIRECT LINK RELEASE REQUEST message from the target UE | Retransmission of PROSE DIRECT LINK REKEYING REQUEST message |
| T5092 | 2s | Upon sending a PROSE DIRECT LINK AUTHENTICATION REQUEST message | Upon receiving a PROSE DIRECT LINK AUTHENTICATION RESPONSE or DIRECT LINK AUTHENTICATION REJECT message from the target UE | Retransmission of PROSE DIRECT LINK AUTHENTICATION REQUEST message |
| T5093 | 2s | Upon sending a PROSE AA MESSAGE TRANSPORT REQUEST message | Upon receiving a PROSE AA MESSAGE TRANSPORT RESPONSE message from the target UE | Retransmission of PROSE AA MESSAGE TRANSPORT REQUEST message |
| T5094 | 8s | Upon sending a PROSE PATH SWITCHING REQUEST message | Upon receiving a PROSE PATH SWITCHING ACCEPT message from the target UE | On 1st expiry and 2nd expiry: Retransmission of PROSE PATH SWITCHING REQUEST message;On the 3rd expiry, the procedure is aborted (see clause 7.7.3.6.1) |
| T5095 | 2s | Upon sending a PROSE UE TO UE RELAY UPDATE REQUEST message | Upon receiving a PROSE DIRECT RELAY UPDATE ACCEPT message from the ProSe layer-3 UE to UE relay UE | Retransmission of PROSE UE TO UE RELAY UPDATE REQUEST message |
| NOTE 1: If the Target user info is not included in the PROSE DIRECT LINK ESTABLISHMENT REQUEST message, then the initiating UE may keep the timer T5080 running upon receiving PROSE DIRECT LINK ESTABLISHMENT ACCEPT message.NOTE 2: The value of this timer is the privacy timer value which is one of the configuration parameters for 5G ProSe direct communication (see clause 5.2.4 and clause 5.2.5) and it is specified in 3GPP TS 24.555 [17] clause 5.4, clause 5.5 and clause 5.6. |

\* \* \* Next Change \* \* \* \*

## 12.11 Timers of 5G ProSe UE-to-UE relay discovery with model B

Table 12.11.1: 5G ProSe UE-to-UE relay discovery with model B timers

| TIMER NUM. | TIMER VALUE | CAUSE OF START | NORMAL STOP | ONEXPIRY |
| --- | --- | --- | --- | --- |
| T5110 | 2s | Upon sending the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the UE and the 5G ProSe UE-to-UE relay UE with which the UE has a link established | Upon receiving the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery response from the 5G ProSe UE-to-UE relay UE with which the UE has a link established | Retransmission the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation |
| T5111 | NOTE | Upon receiving the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery response used for the the PROSE PC5 DISCOVERY message signal strength measurement from the 5G ProSe UE-to-UE relay UE with which the UE has a link established | Upon releasing the 5G ProSe direct link with a 5G ProSe UE-to-UE relay UE | Sending the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the UE and the 5G ProSe UE-to-UE relay UE with which the UE has a link established |
| T5112 | 2s | Upon sending the PROSE PC5 DISCOVERY message for UE-to-UE relay discovery solicitation used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the 5G ProSe UE-to-UE relay UE and the discoveree end UE with which the 5G ProSe UE-to-UE relay UE has a link established | Upon receiving the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery response from the discoveree end UE with which the 5G ProSe UE-to-UE relay UE has a link established | Retransmission the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation |
| T5113 | NOTE | Upon receiving the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery response used for the the PROSE PC5 DISCOVERY message signal strength measurement from the discoveree end UE with which the 5G ProSe UE-to-UE relay UE has a link established | Upon releasing the 5G ProSe direct link with a 5G ProSe UE-to-UE relay UE | Sending the PROSE PC5 DISCOVERY message for 5G ProSe UE-to-UE relay discovery solicitation used to trigger the PROSE PC5 DISCOVERY message signal strength measurement between the 5G ProSe UE-to-UE relay UE and the discoveree end UE with which the 5G ProSe UE-to-UE relay UE has a link established |
| NOTE: The value of this timer is left to implementation. |

\* \* \* End of Changes \* \* \* \*