

# INTERNATIONAL STANDARD

**Multimedia home network configuration – Basic reference model**  
**Part 2: Operational model**

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IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

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# INTERNATIONAL STANDARD

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**Multimedia home network configuration – Basic reference model**  
**Part 2: Operational model**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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BASIC REFERENCE MODEL****Part 2: Operational model****FOREWORD**

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The text of this International Standard is based on the following documents:

| CDV          | Report on voting |
|--------------|------------------|
| 100/2812/CDV | 100/2902/RVC     |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62608 series, published under the general title *Multimedia home network configuration*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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## INTRODUCTION

Network connectivity is necessary for using electronic devices at home as well as electronic power. Some applications running on the devices do not work without a home network and the Internet. When a device connects to the home network, it is required that an appropriate network service be already provided. Sometimes, applications need to change the configuration of the device, the gateway, and so on. Since it is too difficult to change the configuration of the device manually, an automatic configuration mechanism is needed for home networks.

This document specifies the basic reference model to configure the devices connected to the home network. The purpose of this document is to provide the configuration framework for network applications running on the devices.

Part 1 specifies the basic reference model. Part 2 specifies the protocol between each component. Part 3 specifies the metadata and data model exchanged on the protocol. Part 4 provides security guidelines for the reference model.

The reference model is structured by existing protocols and web technologies.

The network service designed as a distributed system works in a coordinated manner with each system. It is difficult to manage whole systems because each system operates independently with different managers. The configurator manages the home network to provide a stable network service for consumer electronics.

Various protocols for cable, data link, and IP networks are specified by each standards organization. This document adopts existing protocols to manage configurations for consumer electronics.

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# MULTIMEDIA HOME NETWORK CONFIGURATION – BASIC REFERENCE MODEL

## Part 2: Operational model

### 1 Scope

This document specifies the operational model for home network configuration.

In the home network, various CE devices that have distinctive functions are connected on a shared network. However, there is no manager in the home network. Thus, a standardized network management procedure is required for suitable network operation.

This document specifies the management procedure as sequences. The sequences are typical procedures of management. This document also describes implementation requirements, and the protocols between each component.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1

##### **home network**

network that connects equipment to be configured in the model; the network is built mainly in a home

#### 3.2

##### **home gateway**

equipment that relays communication from target equipment to the outside of the home network

#### 3.3

##### **configurator**

entity that configures equipment

#### 3.4

##### **configured agent**

entity that sends configuration information to the configurator

### 3.5

#### **cloud server**

server that collaborates with the configurator to accomplish the required function located outside of the home

Note 1 to entry: Cloud servers include a service server, a quality check server, a service failure information server and a diagnosis server.

## 4 Sequences

### 4.1 General

This document defines basic sequences based on IEC 62608-1. Detailed use cases and sequences are addressed under TTC TR-1062.

The configurator serves to configure the IP network environment when device applications need to use the IP network. Clause 4 describes configurator use cases and sequences.

### 4.2 Sequence 1: new device connection

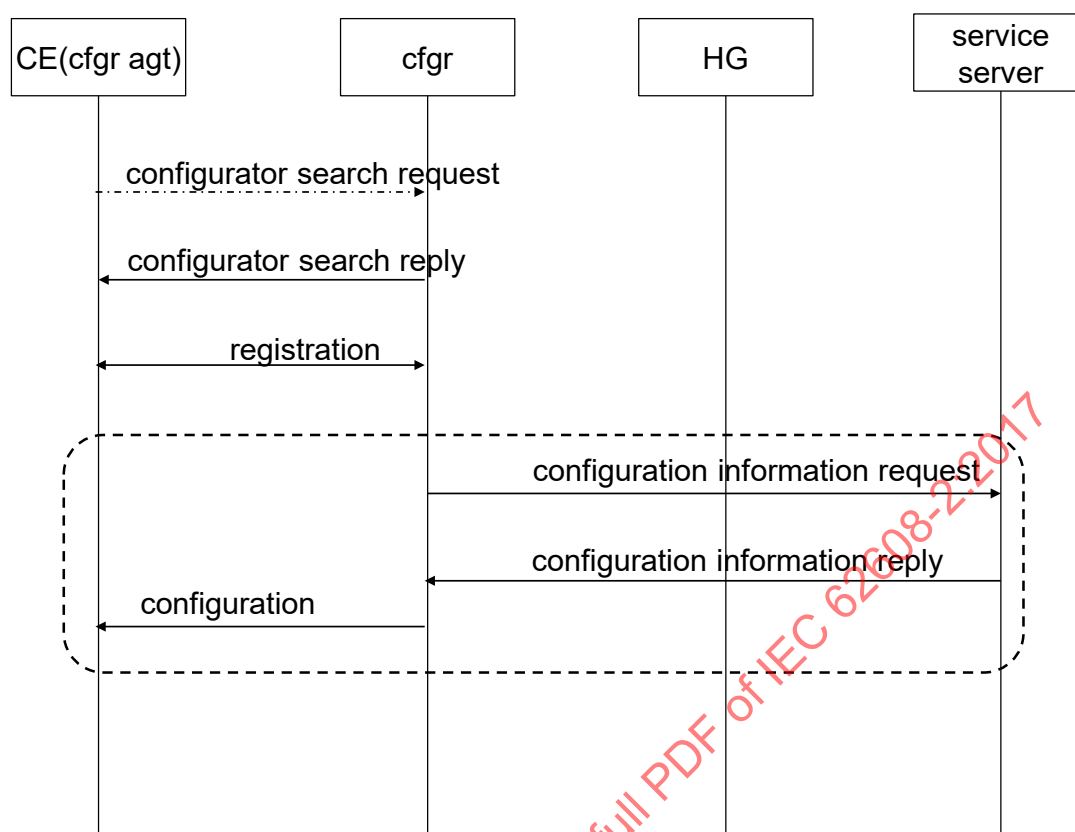
Sequence 1 shown in Figure 1 is the IP network configuration when new device is connected to the home network. This sequence is 1-1.A in TTC TR-1062:2016.

Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server (equipment and configuration management server).

Sequences:

- 1) The configured agent on the device discovers the configurator.
- 2) The configurator replies its ID to the configured agent.
- 3) The configured agent registers its information to the configurator.
- 4) If needed, the configurator registers the configured agent information to the service server.
- 5) If needed, the configurator requests the configuration information to the service server.
- 6) If requested, the service server replies the configuration information to the configurator.
- 7) If needed, the configurator configures the device running on the configured agent.



#### Key

|                                      |                                                |
|--------------------------------------|------------------------------------------------|
| Arrow                                | function from source to destination            |
| Double-headed arrow                  | function with source and destination           |
| An area enclosed in a dashed outline | optional sequence                              |
| Long-dashed short-dashed line        | broadcast sequence                             |
| CE (cfgr agt)                        | consumer electronics device (configured agent) |
| cfgr                                 | configurator                                   |
| HG                                   | home gateway                                   |

**Figure 1 – Sequence 1: new device connection**

#### 4.3 Sequence 2: IP network configuration when device connection is changed

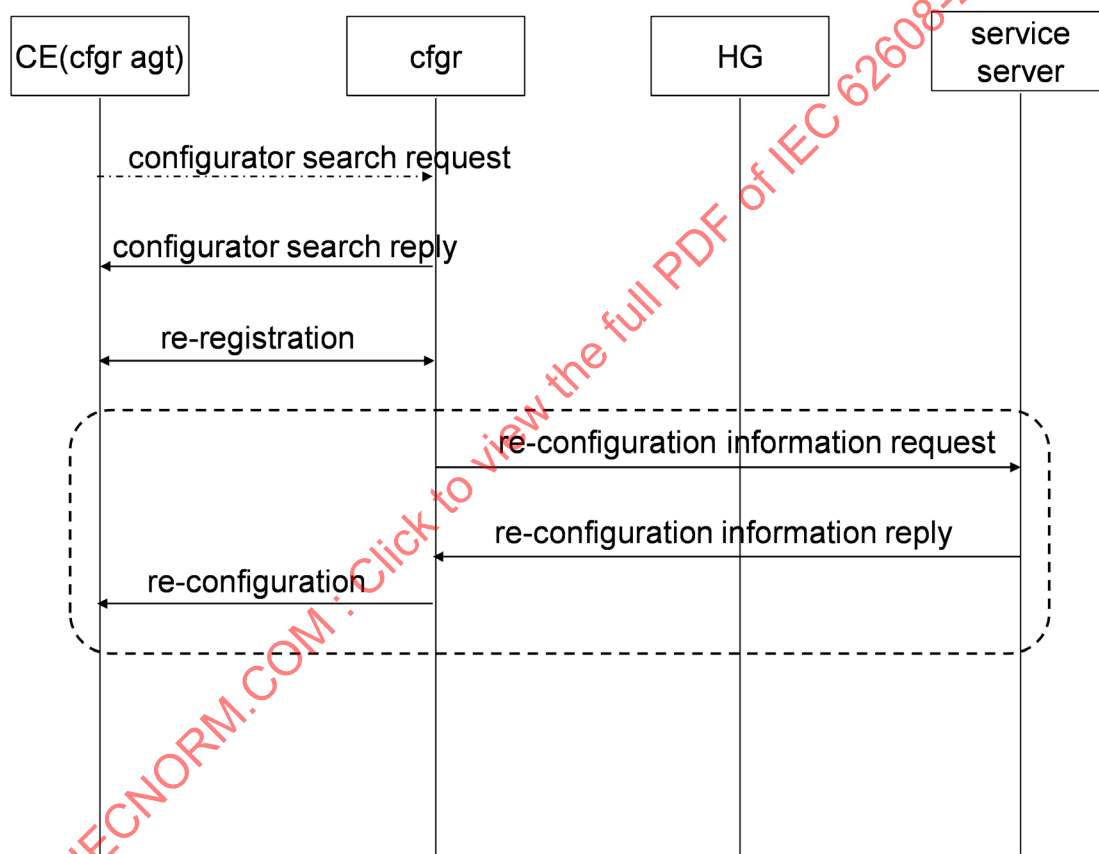
Sequence 2 shown in Figure 2 is the IP network configuration when a device connection is changed. It is assumed that the device is moving in the home network, changing its connection media (e.g. from wired LAN to wireless LAN). It is when there is no need to discover the configuration because the device has information for access to the configuration. If the device cannot establish a connection with the configurator, the sequence will switch to 4.2. This sequence is 1-1.C in TTC TR-1062:2016.

Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server: equipment and configuration management server.

## Sequences:

- 1) If needed, configuration information is registered with the service server.
- 2) Configured agent on the device requests re-registration on the configurator.
- 3) The configurator replies its ID to the configured agent.
- 4) The configured agent re-registers its information to the configurator.
- 5) If needed, the configurator re-registers the configured agent information to the service server.
- 6) If needed, the configurator requests the configuration information to the service server.
- 7) If requested, the service server replies the configuration information to the configurator.
- 8) If needed, the configurator re-configures the device running on the configured agent.



## Key

|                                      |                                                |
|--------------------------------------|------------------------------------------------|
| Arrow                                | function from source to destination            |
| Double-headed arrow                  | function with source and destination           |
| An area enclosed in a dashed outline | optional sequence                              |
| Long-dashed short-dashed line        | broadcast sequence                             |
| CE (cfgr agt)                        | consumer electronics device (configured agent) |
| cfgr                                 | configurator                                   |
| HG                                   | home gateway                                   |

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Figure 2 – Sequence 2: device connection change

#### 4.4 Sequence 3: access from a mobile device to CE device on the home network

Sequence 3 shown in Figure 3 is the establishment, through the configurator, of a connection between a mobile device outside the home network and a CE device on the home network. This sequence is 2-1.B in TTC TR-1062:2016.

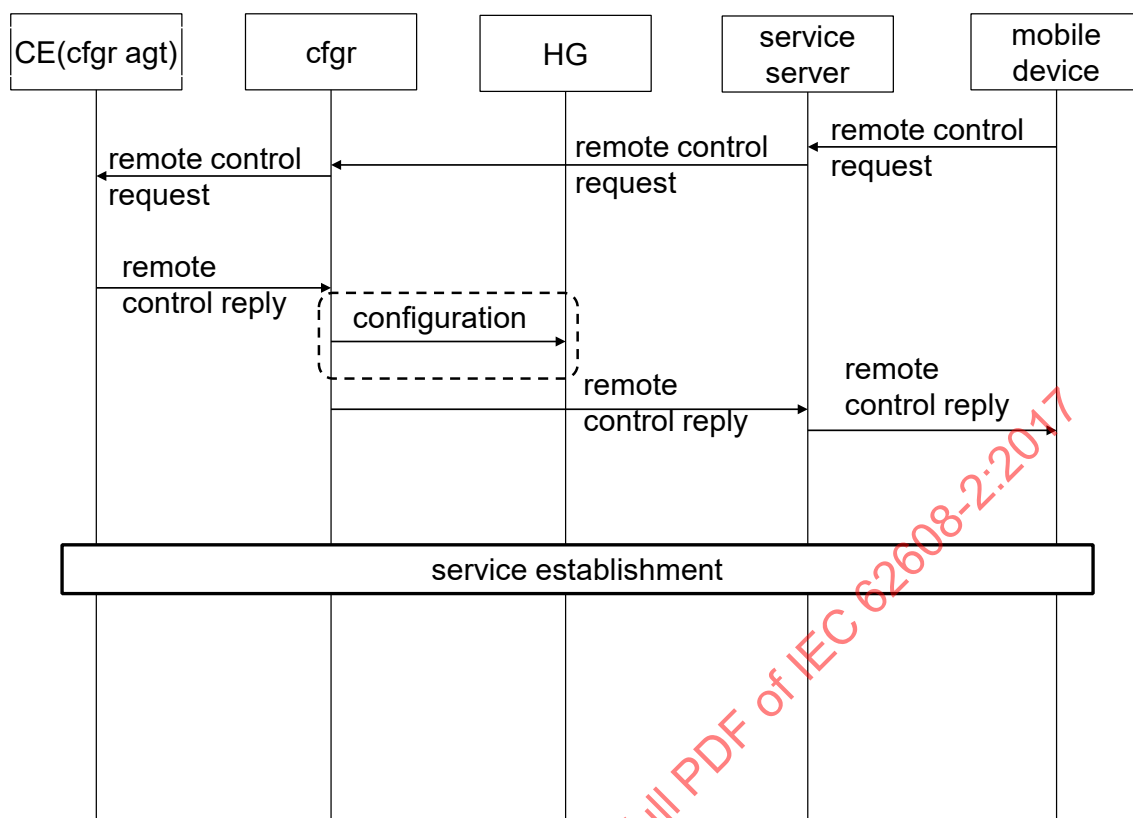
Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server: equipment and configuration management server,
- mobile device: mobile device and application to access the configurator.

Sequences:

- 1) The mobile device requests to the service server to establish a connection with the configurator.
- 2) The service server requests to control to configurator.
- 3) The configured agent replies to the configurator.
- 4) If needed, the configurator configures the home gateway.
- 5) The configurator replies to the service server.
- 6) The service server replies to the mobile device.
- 7) The connection is established between the mobile device and the CE device.

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**Key**

Arrow

function from source to destination

An area enclosed in a dashed outline

optional sequence

CE (cfgr agt)

consumer electronics device (configured agent)

cfgr

configurator

HG

home gateway

**Figure 3 – Sequence 3: access from a mobile device to CE device****4.5 Sequence 4: access with other home network**

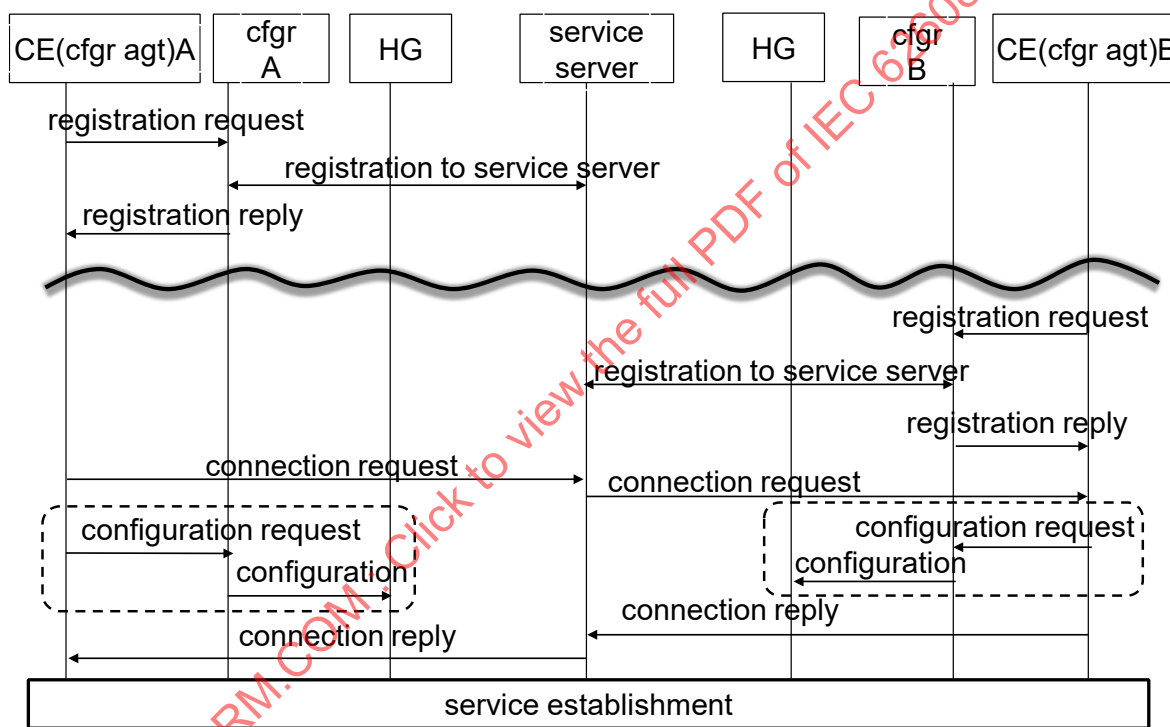
Sequence 4 shown in Figure 4 is the connection being established between a CE device A on a home network and a CE device B on the other home network through the configurator. This sequence is 2-2.B in TTC TR-1062:2016.

Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server: configuration and connection management server.

Sequences:

- 1) The configured agent on CE device A requests to configurator A the establishment of a connection with CE device B.
- 2) Configurator A negotiates with the service server.
- 3) Configured agent on CE device B requests to configurator B the establishment of a connection with CE device A.
- 4) Configurator B negotiates with the service server.
- 5) Configured agent A and configured agent B request the establishment of a connection to the service server.
- 6) If needed, configurator A configures CE device A, configurator B configures CE device B.
- 7) Configured agent A and configured agent B establish a connection.



#### Key

|                                      |                                                |
|--------------------------------------|------------------------------------------------|
| Arrow                                | function from source to destination            |
| Double-headed arrow                  | function with source and destination           |
| An area enclosed in a dashed outline | optional sequence                              |
| CE (cfgr agt)                        | consumer electronics device (configured agent) |
| cfgr                                 | configurator                                   |
| HG                                   | home gateway                                   |

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**Figure 4 – Sequence 4: access with other home network**

## 4.6 Troubleshooting for IP network

### 4.6.1 General

The configurator provides support for fixing the IP network configuration when an application on the CE device does not work because of network trouble.

There are three types of trouble on the IP network.

#### **4.6.2 CE device configuration trouble**

When the CE device is misconfigured, the CE device should show the problem to the user.

#### **4.6.3 Sequence 5: network-level connection trouble**

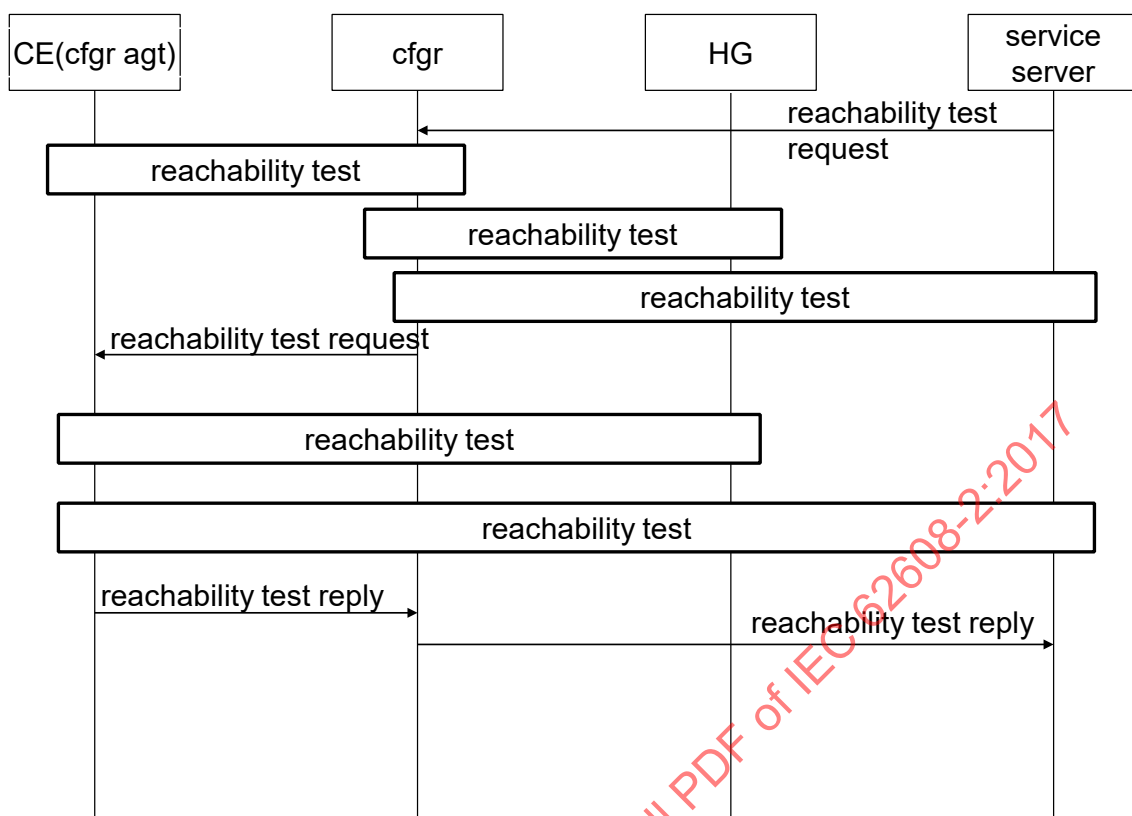
Sequence 5 shown in Figure 5 is used to troubleshoot the network-level connection. When there is a network connection problem on the home network, the configurator checks that the CE device is physically connected properly and that the networking cables are not damaged by using an HTIP protocol and checks the IP connection outside of the home network. This sequence is 3-2.A in TTC TR-1062:2016.

Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server: equipment and configuration management server.

Sequences:

- 1) The service server requests to the configurator to check reachability.
- 2) The configurator requests the configured agent to check reachability.
- 3) The configurator checks reachability with the HTIP collector.
- 4) The configurator checks IP reachability in collaboration with the service server.
- 5) The configured agent checks IP reachability in collaboration with home gateway.
- 6) The configured agent checks IP reachability in collaboration with service server.
- 7) Configurator replies the result to the service server.



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#### Key

|                                      |                                                |
|--------------------------------------|------------------------------------------------|
| Arrow                                | function from source to destination            |
| An area enclosed in a dashed outline | optional sequence                              |
| Long-dashed short-dashed line        | broadcast sequence                             |
| CE (cfgr agt)                        | consumer electronics device (configured agent) |
| cfgr                                 | configurator                                   |
| HG                                   | home gateway                                   |

**Figure 5 – Sequence 5: network-level troubleshooting in the home network**

#### 4.6.4 Sequence 6: application-level connection trouble

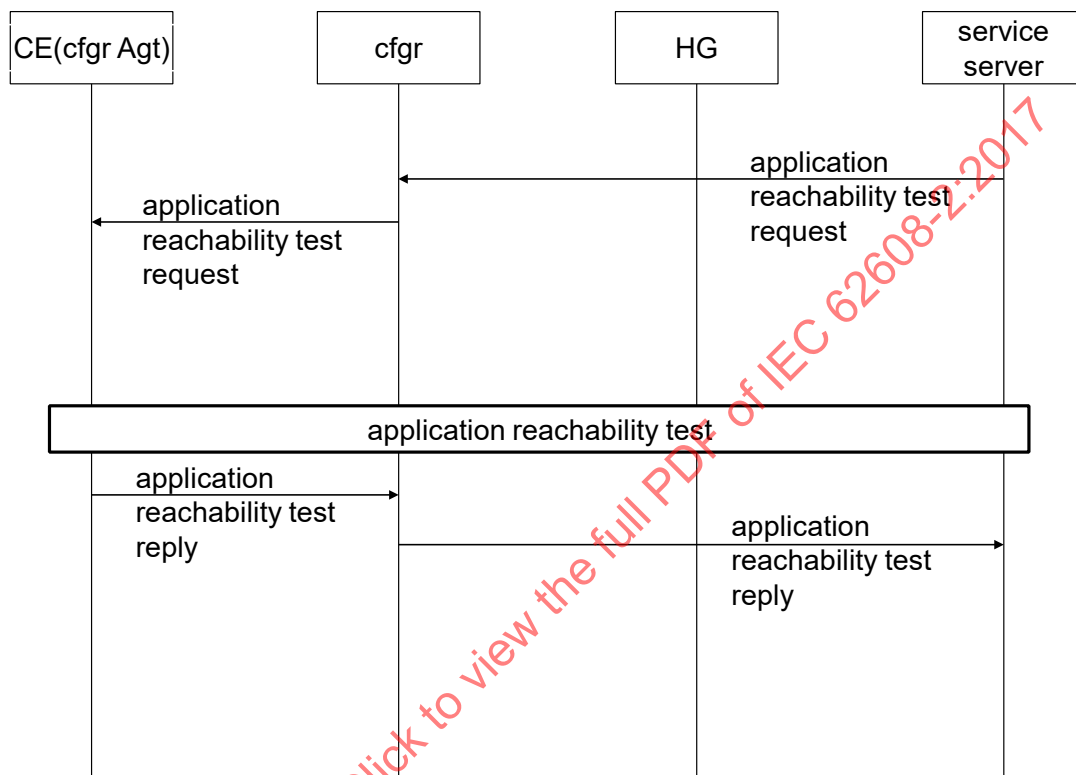
Sequence 6 shown in Figure 6 is used to troubleshoot the application-level connection. When the CE device application cannot reach the target service outside the home network, the configurator tries to access the reference server that has guaranteed access at any time. If the configurator cannot access the target service but can access the reference server, the target service has a problem. In this case, there is no trouble on the home network. This sequence is 3-3.A in TTC TR-1062:2016.

#### Actors:

- CE: consumer electronics device,
- HG: home gateway,
- configurator,
- service server: equipment and configuration management server.

Sequences:

- 1) The service server requests the configurator to check reachability.
- 2) The configurator requests the configured agent to check reachability of the application.
- 3) The configurator checks application reachability in collaboration with the service server.
- 4) The configurator replies the result to the service server.



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#### Key

|               |                                                |
|---------------|------------------------------------------------|
| Arrow         | function from source to destination            |
| CE (cfgr agt) | consumer electronics device (configured agent) |
| cfgr          | configurator                                   |
| HG            | home gateway                                   |

**Figure 6 – Sequence 6: application-level troubleshooting outside the home network**

## 5 Architecture of the configurator and the configured agent

This specification requires the following precondition: the CE device and related devices are switched on, all cables are physically connected, and the link layer network is active. The configurator should operate as an HTIP collector because the configurator checks the link layer connection using HTIP.

NOTE HTIP is specified by Recommendation ITU-T G.9973.

The following functions should be installed in the configurator:

- an HTIP collector,
- a management database,