
**Information technology — User
interfaces — Face-to-face speech
translation —**

**Part 1:
User interface**

*Technologies de l'information — Interface utilisateur — Face-à-face
discours traduction —*

Partie 1: Interface utilisateur



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Foreword

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A list of all parts in the ISO/IEC 20382 series can be found on the ISO website.

Introduction

It is important to consider people with special requirements to ensure that they can gain the same benefits from ICT. One of those special requirements is to help people to avoid language barriers in global environments. Automatic speech translation systems have existed for a long time, but they have functional limitations as well as technical ones with regard to usability and accessibility.

One reason for these limitations is the diversity of the languages currently used. It is difficult to support many languages by one or several speech translation systems. A flexible and interoperable standardized framework is needed to work with all different languages, utilizing many speech translation systems already developed in many countries. Other considerations to make a natural and usable speech translation service possible include applying users' characteristics within the system, such as emotion, speech style, gender type and other attributes. To reflect those characteristics in the output speech translation, a standardized user interface should reflect the input and output data and transfer them to the user's device.

The main purpose of this document is to help users of different languages by providing speech translation service in easier and more convenient ways with a standardized user interface for face-to-face speech translation.

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Information technology — User interfaces — Face-to-face speech translation —

Part 1: User interface

1 Scope

This document specifies face-to-face speech translation designed to interoperate among multiple translation systems with different languages. It also specifies the speech translation features, general requirements and functionality, thus providing a framework to support a convenient speech translation service in face-to-face situations. This document is applicable to user interfaces for speech translation and communication protocols for setting up a translation session among users. This document is not applicable to defining the speech translation engine itself.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 20382-2:2017, *Information technology — User interface — Face-to-face speech translation — Part 2: System architecture and functional components*

3 Terms and definitions

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

The 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

face-to-face

arrangement where two users are physically in the same location

3.2

short range wireless communication

SRWC

wireless transmission that uses signals that travel from a few centimetres to several metres

EXAMPLE Bluetooth.

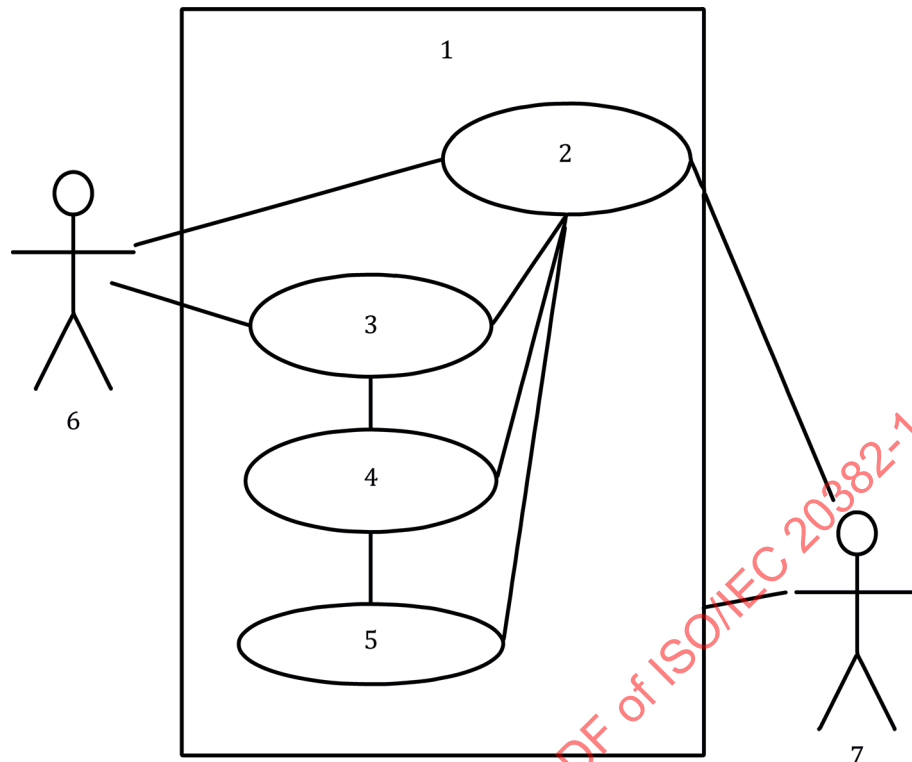
4 Abbreviated terms

AI	audio indicator
F2F	face-to-face
TTS	text to speech
VI	video indicator
WD	wearable device
MD	mobile device

5 Overview of face-to-face speech translation

5.1 General

A face-to-face speech translation system enables users of different languages to communicate with each other with spoken languages in a face-to-face situation by providing machine translation results (as in [Figure 1](#)). (For standardization activities for speech translation, see [Annex A](#)). In a face-to-face speech translation system, mobile devices and wearable devices, such as earphones, are used for convenient user experiences. The main functions of wearable devices in the translation system are the processing of input and output of speech signals as a microphone and speakers. Speech recognition and speech synthesis are performed in each user's mobile device. The machine translation function resides in the translation servers.

**Key**

- 1 F2F speech translation system
- 2 UI set-up
- 3 speech recognition (see ISO/IEC 20382-2)
- 4 language translation (see ISO/IEC 20382-2)
- 5 speech synthesizer (see ISO/IEC 20382-2)
- 6 speaker
- 7 listener

Figure 1 — Service example of face-to-face speech translation

5.2 Service flow

The following steps are typical speech translation service processes in a face-to-face speech translation system. For more information, see ISO 20382-2:2017, 6.2 and Figure 2.

- 1) After a session connection is made between user A and user B, speech is input by user A in language A. The speech signal is transmitted to the mobile device of user A.
- 2) The speech is recognized by a speech recognition module in the mobile device of user A. Then, the translation operation is requested to machine translation server K.
- 3) The translation is performed at server K and the result, which is in language B, is sent back to the mobile device of user A in text form.
- 4) The translation result is then sent to the mobile device of user B through SRWC communication.
- 5) The translation result, which is in text form, is transformed to a speech signal in language B by a speech synthesizer (TTS) and sent to the wearable device of user B.
- 6) For user B's speech, steps (6) to (10) are performed in the same way and the session ends.

5.3 Service types

There are two service types depending on the number of participants in the translation session:

- two way translation: Two users are participating in the translation session;
- multi-way translation: More than three users are participating in the translation session. The participants may start the dialogue at different points in time.

5.4 Service mode

Several service modes are selected for usability in different situations.

- Open mode: In this mode, the dialogue is not protected and can be heard by the public. Any user can barge into the dialogue.
- Protected mode: In this mode, only allowed users can participate in the translation session and privacy is guaranteed. The dialogue is protected and not heard by the public.
- Automatic mode: The session starts and ends by automatic operation.
- Manual mode: In this mode, the user can decide to be connected to other users manually.

5.5 Service situation

Several situations are classified as crowded and non-crowded depending on the number of candidates of users.

- Crowded situation: In this situation, many candidates are nearby for the translation session.
- Non-crowded situation: In this situation, only one or two candidates are nearby for the translation session.

6 Functional requirements

6.1 User communication requirements

6.1.1 General

6.1.2 Required

- The translation system shall allow the users to start a translation session with less than 3 operations.

NOTE The user is able to start a translation session with as few operations as possible.

- The translation system shall allow the users to start a translation session within 10 seconds.

6.1.3 Optional

- The translation system should allow the users to have a session with multiple users.
- The translation system should allow the users to have additional participants after the session starts.
- The translation system should allow the users to have a session with available target users by approaching them.

6.2 User interface requirements

6.2.1 General

6.2.1.1 Required

- There shall be no restriction on the users to use the translation system.

NOTE Any user can use the user interface of the translation system.

6.2.1.2 Optional

- The results of speech recognition and translation should be displayed.
 - The user should be able to edit the text output of the speech recognition module.
 - Frequently used functions should be shown on the top-level menu.
 - The depth of menu should not exceed 4 steps.
 - There should be a button to go back to the top-level menu.
 - The user interface should provide options to select alternate translation results.
- NOTE The user chooses among the translation results, speech or text, on the screen.
- The user interface should provide options for preferences such as gender, emotion, speech style and other features defined in the user profile.
 - The user interface should provide the functionality that reflects the user's characteristics defined in the user profile.

6.3 User device requirements

6.3.1 General

6.3.1.1 Required

None.

6.3.1.2 Optional

- The translation device should provide a function to allow the user to show the signal to participate in the current translation session.
- The translation devices should operate easily.

NOTE If the time to start operating a specific function takes more than 3 minutes, it does not satisfy this requirement.

6.4 Accessibility requirements

6.4.1 General

6.4.1.1 Required

- The input from the user shall be in a text form as well as a speech form for people with speaking disabilities.

- The translated results shall be provided in a text form as well as a speech form for people with hearing disabilities.

6.4.1.2 Optional

- The translated results should also be provided in a controlled language for people with mental disabilities.

NOTE Controlled languages are defined by ISO/TC 37 (see ISO/TS 24620-1).

7 Functional components of face-to-face speech translation

7.1 Service protocol among functional components

The workflow and service protocol among components of face-to-face speech translation are described in [Figure 2](#).

1. Connection stage:

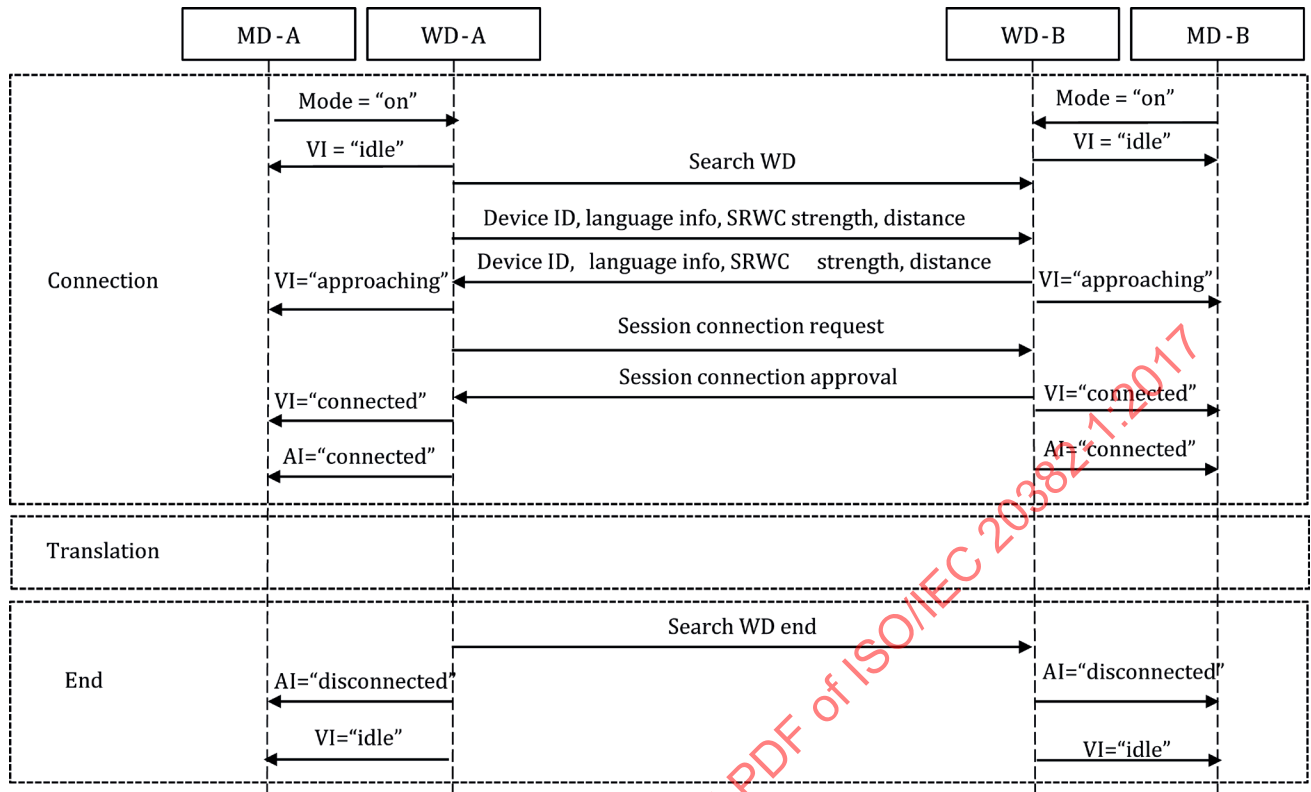
In the connection stage, users who wish to participate in the translation service set the translation mode as “ON” and this information is sent to each user’s wearable device (WD). Then the WD sets the visual indicator (VI) as “idle” meaning the user is in translation-ready mode. The WD automatically starts searching for available WDs nearby and exchanges device IDs and language information with them. It then measures the signal strength of the WDs and produces a candidate WD target list. The WD searches for the direction/approaching information of the candidate WDs and sends the session connection message with the VI “approaching”. When the WD connection is approved, the VI of both WDs changes into a “connected” state with an Audio Indicator (AI) signalling “connected”.

2. Translation stage:

After the connection between two WDs is made, the translation starts. The translation stage is described in detail in ISO/IEC 20382-2.

3. End (disconnection) stage:

The WD checks regularly if the session needs to be disconnected. If it finds no activity it turns the VI to “idle” with the AI “disconnected” and ends the session. It also resets the target languages.



- MD-A: Mobile device of language A
- WD-A: Wearable device of language A

- MD-B: Mobile device of language B
- WD-B: Wearable device of language B

Figure 2 — Sequence diagram of face-to-face speech translation (UI set-up)

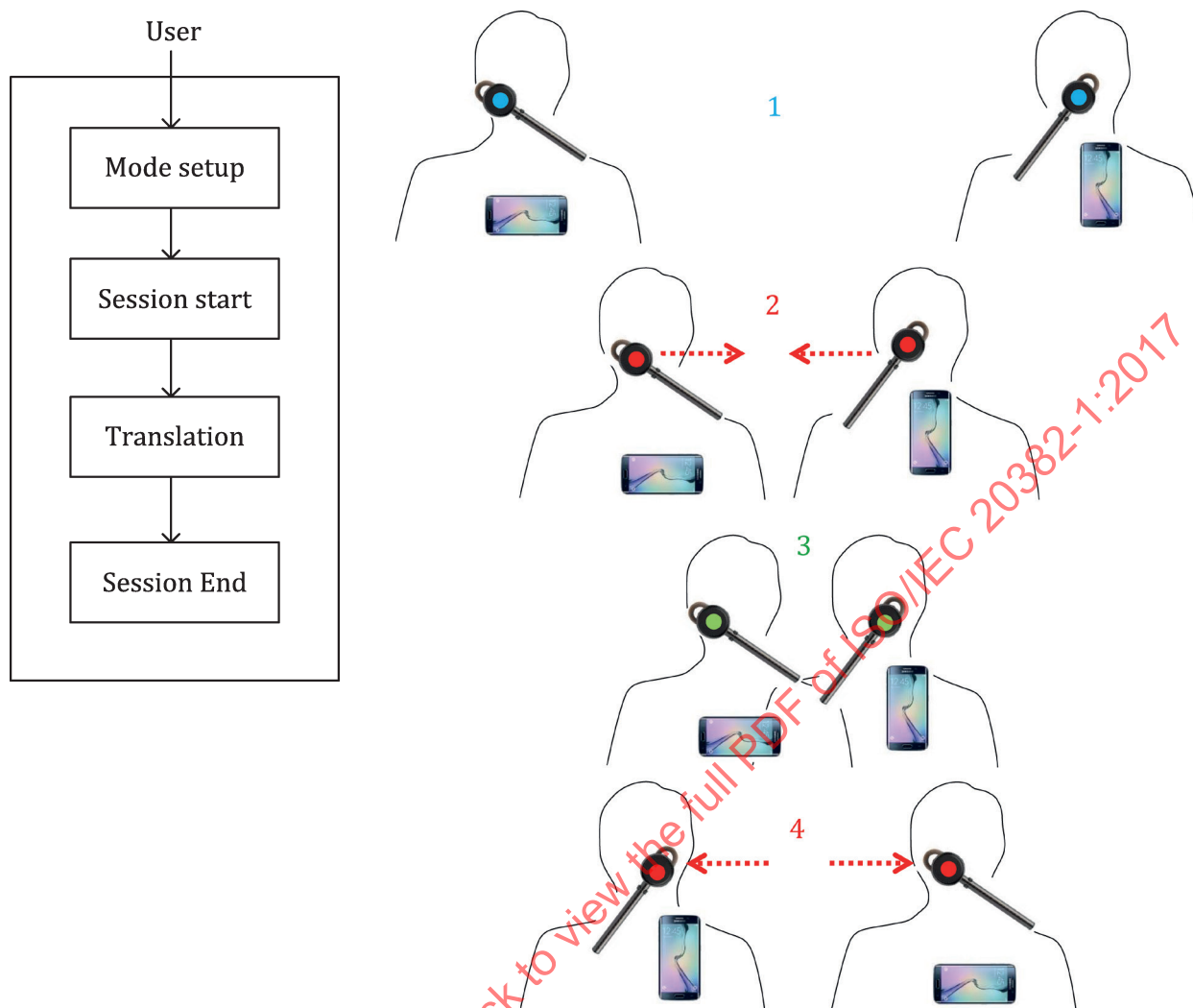
7.2 User communication functional block

7.2.1 General

The user communication functional block includes the Connection stage and End stage described in [Figure 2](#). Before the actual translation begins, the user should find a translation partner among candidate users according to the communication steps in [7.2.2](#).

7.2.2 Steps for user communication

To start the user communication, the user of the translation application first sets up the mode as he or she wishes. For example, the user may want to use a protected mode, in which only the participants in the translation session can hear the conversation. The next step, as in [Figure 3](#), is the start of the translation session. The translation step itself is between the session start and session end. More details of the translation session connection and disconnection are described in [7.2.3](#) and [7.2.4](#).

**Key**

- 1 idle
- 2 approaching
- 3 connecting
- 4 disconnecting

Figure 3 — User communication for translation session**7.2.3 Translation session connection**

The translation session starts by searching for WD around the user. As shown in [Figure 4](#), the user starts searching for WDs by exchanging device ID information, language information and SRWC strength calculation. Then the user produces a candidate WD list based on the information gathered from the WDs around him. After measuring the approaching WD information, WD connection with a best candidate is approved. The decision on the approaching WD is made based on the distance and direction of the candidate. After the translation session connection is made, the translation starts between the two users.

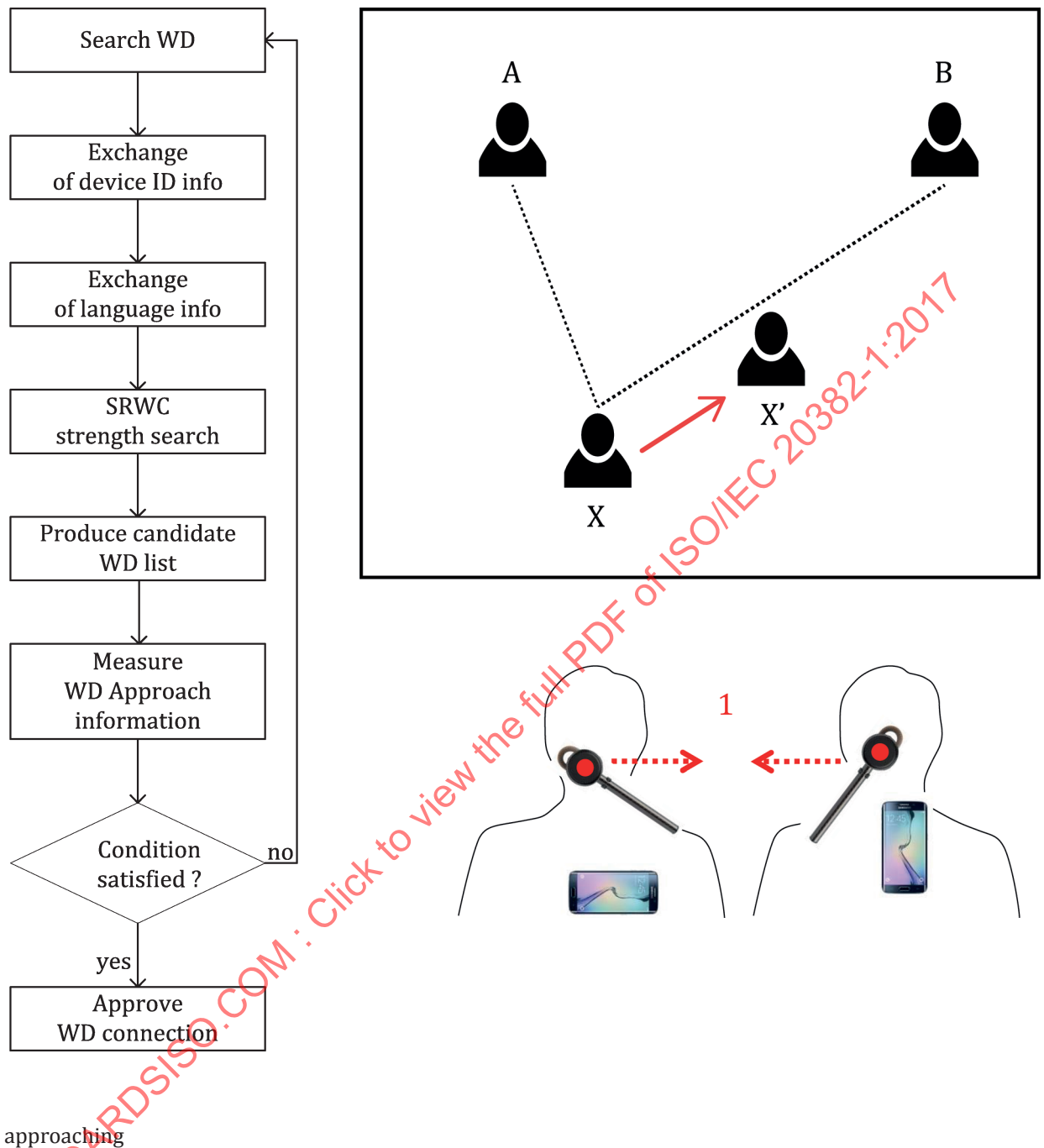


Figure 4 — Translation session connection

7.2.4 Translation session disconnection

The disconnection of the translation session (see [Figure 5](#)) is also performed automatically from the user's point of view. When there is no connected WD and the session end condition is met, the target language is reset for the next translation session and the session ends.

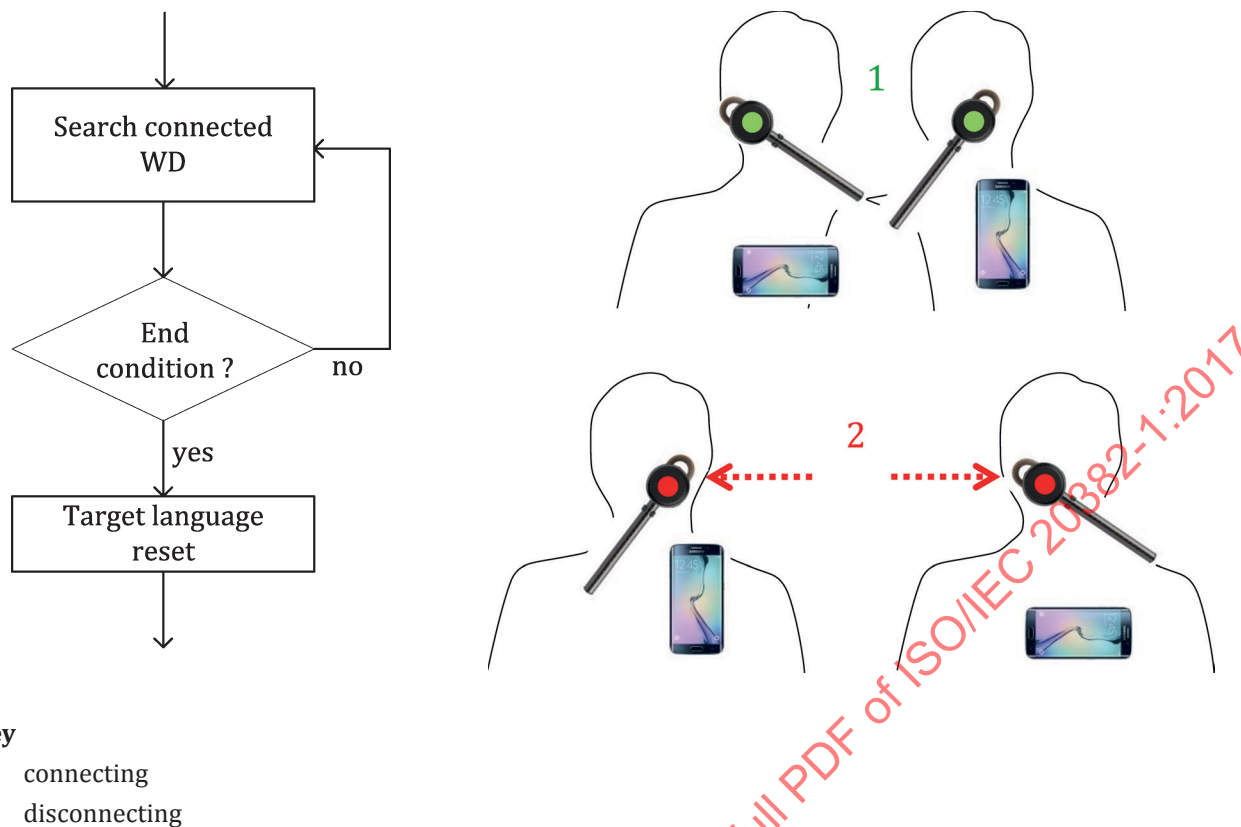
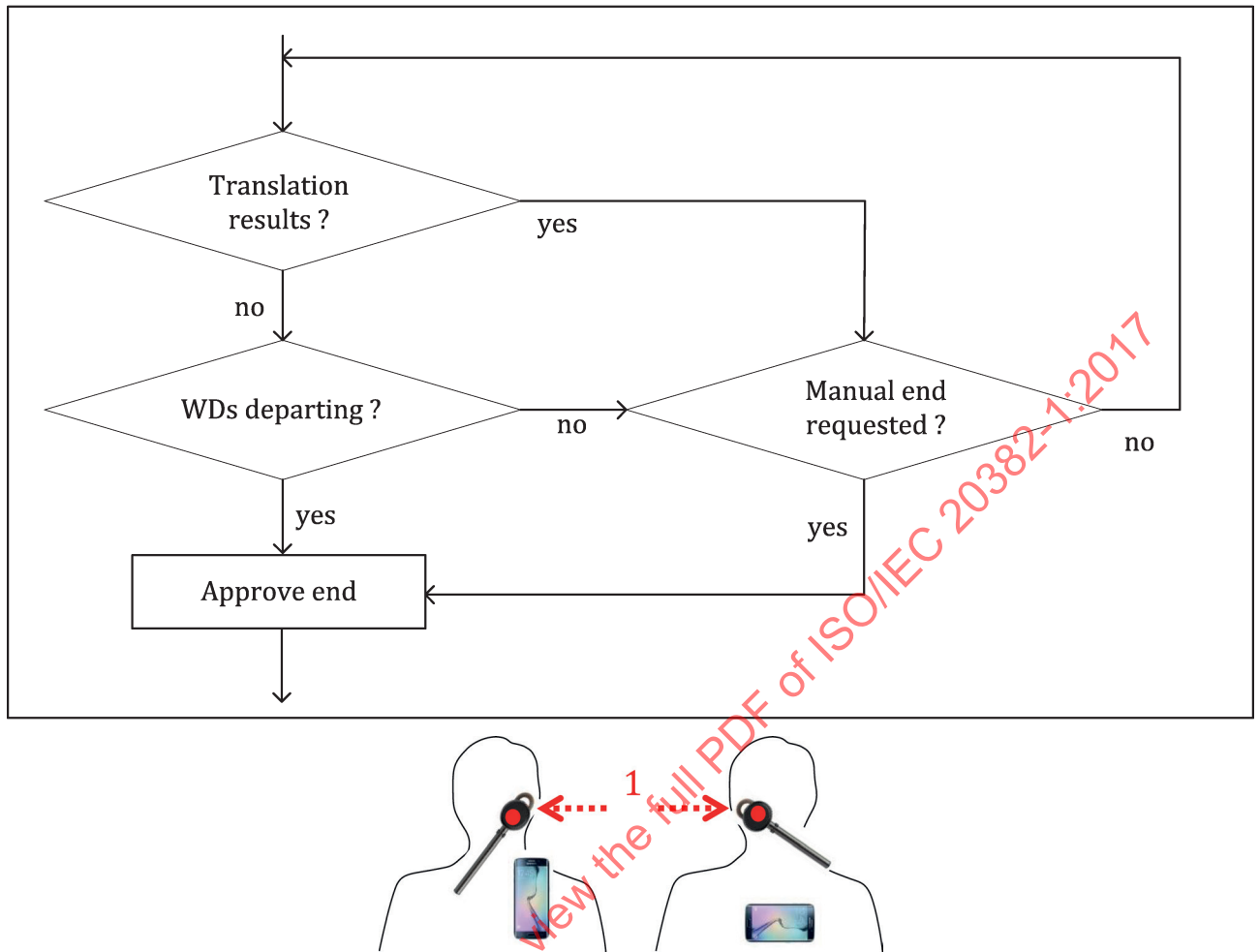


Figure 5 — Translation session disconnection

7.2.5 Translation session end condition

The translation session end condition is presented in Figure 6, where the existence of translation results, departing WDs and manual end requests are one of the ending conditions. When the translation results are not produced for a certain time, the system checks whether or not the WDs are departing. If the translation is continuing but there is a manual end request made, the end condition is still met and the session end is approved.

**Key**

1 disconnecting

Figure 6 — End condition of translation session**7.3 User interface functional block****7.3.1 General**

A user interface functional block (see [Figure 7](#)) has the following functions.

7.3.2 Setup of the initial translation environments

- Turn on/off SRWC;
- Start the F2F translation session;
- Select the source language;
- Mode selection between protected/non-protected.