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BSI Standards Publication

Information technology — User interfaces — Gesture-based interfaces across devices and methods

Part 12: Multi-point gestures for common system actions

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National foreword

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Part 12: Multi-point gestures for common system actions

Technologies de l'information — Interfaces utilisateur — Interfaces fondées sur la gestuelle entre dispositifs et méthodes —

Partie 12: Gestes multi-points pour les actions courantes du système

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Foreword

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A list of all parts in the ISO/IEC 30113 series can be found on the ISO website.

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Introduction

A multi-point gesture is generated by a user with several pointers (which includes an input device such as a multi-touchpad, multi-touchscreen or body parts such as fingertips, hands, etc.) providing gesture actions using a multi-point of interest. Multi-point gestures are used in several commercially available ICT systems including personal computers, smartphones and video game consoles.

There is a need for an international standard to define the multi-point gesture so that users do not get confused. Potential variety and inconsistency among multi-point gestures might cause a serious usability problem in using applications on the ICT systems.

This document presents descriptions of multi-point gestures and their corresponding gesture commands for system-level functions and common functions across applications on ICT systems. The system-level functions include functions for selecting and initiating applications which are handled by operating systems or platforms. The common functions across applications are also identified. These functions include menu navigation, “help”, “undo”, “redo”, and so on.

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Information technology — User interfaces — Gesture-based interfaces across devices and methods —

Part 12: Multi-point gestures for common system actions

1 Scope

This document defines multi-point gestures for common system actions used in information and communication technology (ICT) systems.

It specifies movements and conditions for describing multi-point gestures recognized by the systems and applications. The multi-point gestures are performed using an input device (multi-touchpad, multi-touchscreen, etc.) or body parts (fingertips, hands, etc.). These multi-point gestures are intended to operate in a consistent manner regardless of systems, platforms or applications.

The gestures for common system actions denote system-level functions and common functions across applications of ICT systems. The system-level functions are executed at a system or a platform level. They include initiation, resume, restart and termination, etc. The common functions across applications are commonly executed among applications of a system or a platform. The functions include navigation of menus, opening an object, closing an object, etc.

NOTE ICT systems include, but are not limited to, digital televisions, set-top boxes, video game consoles, communication devices, internet devices, entertainment devices, and personal computers (PCs).

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 24786:2009, *Information technology — User interfaces — Accessible user interface for accessibility settings*

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
gesture-based interface
gesture interface
user interface that provide information and controls for a user to accomplish specific tasks with the interactive system by his/her gestures

[SOURCE: ISO/IEC 30113-1:2015, 3.2]

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3.2
application
app
software application or application software

[SOURCE: ISO/TR 17427-2:2015, 2.1]

3.3
gesture software
software for implementing *gesture-based interface* (3.1) functionality including gesture recognition, command processing and feedback generation

Note 1 to entry: The gesture software could be an embedded combination of input devices, operating systems or applications. An application such as a web browser can contain a gesture software module for handling functions for the application.

[SOURCE: ISO/IEC 30113-1:2015, 3.4 — modified, Note 1 to entry revised.]

3.4
point of interest
POI
specific point location that a user utilizes to formulate a gesture

EXAMPLE Fingertip, pen points, hand etc.

[SOURCE: ISO/IEC 30113-11:2017, 3.1, modified — examples added.]

3.5
movement metaphor
metaphor for expressing relationship between gesture direction and moving object when moving content in a scrollable window to desired position

3.6
content-mover metaphor
movement of content focused
movement metaphor (3.5) for describing the movement of content by a user in a viewing window along a gesture direction

EXAMPLE If a "2-point down" gesture is assigned for page scroll with the metaphor of "movement of content", users see the upper part of the page by using the gesture. The function of the gesture is similar to "page up".

3.7
window-mover metaphor
movement of viewing window focused
movement metaphor (3.5) for describing the movement of content by a user in a viewing window in the opposite direction of a gesture

EXAMPLE If a "2-point down" gesture is assigned for page scroll with the metaphor of "movement of viewing window", users see the lower part of the page by using the gesture. The function of the gesture is similar to "page down".

3.8
mediated gesture
gesture utilized with pointing input(s) such as a mouse, a touchpad, a joystick, a track ball, etc.

3.9
direct touch gesture
gesture utilized with a body part (e.g. a finger) or a physical object (e.g. a stylus) on an input device (e.g. a touchpad or a touchscreen)

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3.10
non-contact gesture
gesture utilized with a sequence of movements of a body part (e.g. a finger) without physical contact on an input device

3.11
content window
viewing window
part of a display image with defined boundaries in which one or more content(s) is(are) displayed

3.12
accelerator keys
shortcut keys
key combinations which invoke a menu option without displaying the menu on which the option appears or intermediate menus

[SOURCE: ISO 9241-171:2008, 3.1]

3.13
sticky keys
keyboard enhancement in which modifier keys, such as control, shift, and alt, "stick", act as if held down while a second key is depressed manually

Note 1 to entry: The sticky keys functionality is available on Microsoft® Windows®[1)] as StickyKeys™, on macOS®* as Sticky Keys™,, and on Unix/X11®* systems as part of the AccessX™* utility. The sticky keys are designed for people who cannot use both hands, or who use a dowel or stick to type. The sticky keys work with those keys defined as "modifier" keys, such as the Shift, Alt and Control keys. Usually the sticky keys status is shown on-screen at the user's option.

[SOURCE: ISO/IEC 24751-1:2008, 0000_11, modified — Note 1 to entry has been added.]

3.14
tap
touch real (or virtual) surface briefly, typically for less than one second, with a point(s) of interest and then lift-off in approximately the same position

[SOURCE: ISO/IEC 14754:1999, 4.13, modified — changing from digitizer to real (or virtual) surface and from pen to point(s) of interest.]

3.15
double-tap
to touch twice rapidly surface with a point(s) of interest

3.16
touch and hold
long touch
touch surface for extended period of time

3.18
rotation
touch surface with one or more POIs and move the POIs in a clockwise or counter-clockwise direction

Note 1 to entry: Rotation with two or more POIs means revolving around a centre of the POIs or revolving around a POI among the POIs.

3.19
pinch
touch surface with two or more POIs to bring the POIs closer together

---

1) Microsoft® Windows® (StickyKeys™), macOS® (Sticky Keys™), and Unix/X11® (AccessX™) are examples of a suitable products available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.

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3.20
spread
touch surface with two or more POIs to move the POIs apart

3.21
context menu
pop-up menu
menu in a graphical user interface that appears upon user interaction offering a limited set of choices that are available in the current state

Note 1 to entry: A context menu is usually shown by a right-click mouse operation.

3.22
common system action
function executed at an OS level or a platform level or common functions among application software

EXAMPLE Going to the previous/next application, showing desktop, executing an application, going the previous/next page of content.

4 Visual description of multi-point gestures

For describing multi-point gestures, this document follows ISO/IEC 30113-1:2015, A.3 and ISO/IEC 30113-11:2017, 5.4.

The starting points of a multi-point gesture are visually represented by circles with solid line as shown in Figure 1. The number of circles is the number of POIs for describing multi-point gestures. The ending points of the multi-point gesture are visually represented by circles with dotted line as shown in Figure 2. If there are no descriptions for the relative positions of the POIs, any relative position is permitted.

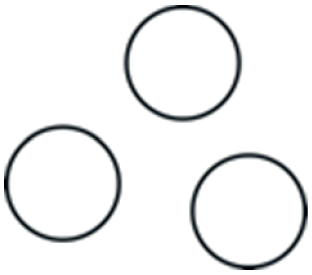

Figure 1 — Circles representing POIs for starting points of a multi-point gesture

Figure 2 — Dotted circles representing POIs for ending points of a multi-point gesture

If the multiple POIs move same direction simultaneously, the POIs are grouped with a rectangle shown in Figure 3.

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a) Starting position b) Ending position

Figure 3 — Rectangle representing grouping POIs

If the multiple POIs of a multi-point gesture move simultaneously in a direction, a line with an arrow (indicating the moving direction) is used for describing movement.

The example in Figure 4 shows a multi-point gesture when the POIs move from left to right simultaneously.

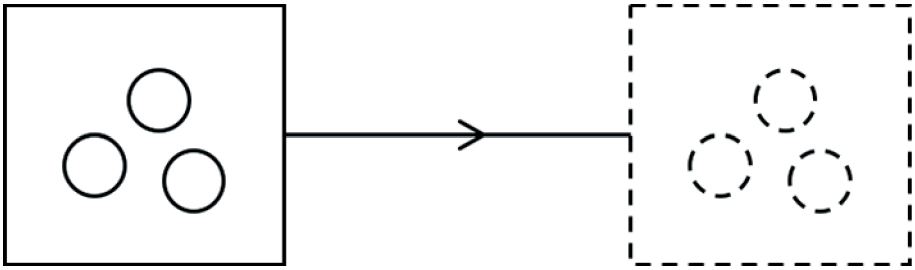

Figure 4 — Multi-point gesture when 3 POIs move from left to right simultaneously

If the multiple POIs move in different direction respectively, each POI has their own line with an arrow. The example in Figure 5 shows a multi-point gesture when the POIs move in different direction.

Figure 5 — Multi-point gesture when 2 POIs move in different direction

A multi-point gesture with a "faster" stroke can be described with two arrows (Figure 6). A representation of the speed of performing gestures is described in ISO/IEC 30113-11:2017, 5.4 in detail.

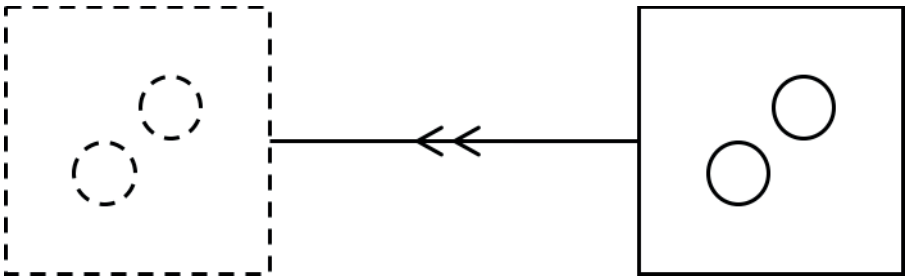

Figure 6 — A multi-point gesture moving fast to the left direction.

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5 General requirements and recommendations

5.1 Alternatives for multi-point gestures

An ICT system utilizing multi-point gestures shall provide one (or more) alternative methods for the gestures. The examples of alternative methods are described in Clause 6.

NOTE There are many users who are not able to use gestures or who are only able to use single-point gestures due to various reasons including physical disability.

5.2 Simple movements

Multi-point gestures with change(s) of movement direction should not be used for a common system action.

NOTE It is not easy for users to handle multiple POIs with change of movement direction.

5.3 Priority in assigning multi-point gestures

A gesture using fewer POIs should be assigned for a command (or a function) which is used more frequently.

EXAMPLE Functions such as turning a page or page scroll are used more frequently than functions such as viewing desktop or moving working space.

The number of POIs of multi-point gestures which are applied to similar actions should be the same.

NOTE Users have difficulties in using multi-point gestures if the “3-point up” gesture is used for displaying virtual desktops and the “3-point left” gesture is used for turning pages.

5.4 Choice of movement metaphor

Gesture software utilizing mediated gestures should provide one or more method for the user’s choice of movement metaphor.

Unless the user changes the movement metaphor for mediated gestures, the movement metaphor shall be used for the system and applications consistently.

5.5 Description of multi-point gestures

All multi-point gestures shall have both a visual description (see Clause 4) and a text description (which could be rendered in any modality).

6 Alternatives for multi-point gestures

There are several alternative methods for utilizing multi-point gestures.

1) Using accelerator keys

   Accelerator keys could perform common actions activated by multi-point gestures. Sticky keys are useful for satisfying user’s accessibility requests in using accelerator keys.

   EXAMPLE 1 A multi-point gesture for swipe between full-screen apps could be the “3-point left” and the corresponding accelerator keys are ‘ctrl’ and ‘←’.

2) Using single-point gestures with accelerator keys

   By single-point gestures with accelerator keys, a user could invoke system commands. There are two ways of using this method.

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During pressing accelerator keys, a user performs a single-point gesture. Then the corresponding command is invoked.

EXAMPLE 2 When pressing "ctrl" key, a user performs the "left" gesture. Then the previous page is shown on the screen. This could give the same result as the 2-point left gesture.

After the user activates accelerator keys, the system waits for a single-point gesture. After the user performs the gesture, the corresponding command is invoked.

Sticky keys can be used to activate accelerator keys for supporting accessibility.

If the computer implements the sticky keys, the setting for the sticky keys shall be in accordance with ISO/IEC 24786:2009, 5.2.1.

EXAMPLE 3 A user sequentially presses the "Ctrl" key and "1" key and performs the "left" gesture. Then the previous app is invoked and shown on the screen. This could give the same result as the 3-point left gesture.

3) Activating a multi-point gesture using a "touch and hold" gesture

When a user touches the surface of a touchpad or touchscreen and holds it for a sufficient time (for example, less than 10s), the system sequentially displays an increasing number of points, from 1 to 4. When the display reaches the number that the user wants, the user performs a single-point gesture and the corresponding command is invoked.

If the user has difficulties to see the screen, a sufficient delay for reading the numbers is provided.

EXAMPLE 4 While a user touches the touchscreen, a number is displayed near the point that the user touches. The number starts from "1" to "3". When the number changes to "2", the user performs the "left" gesture. Then the previous app is invoked and shown on the screen. This could give the same result as the 3-point left gesture.

7 Descriptions of the multi-point gestures

7.1 The "2-point left" gesture

7.1.1 General

The parameters for the "2-point left" gesture are:

— Unique (internal) identifier: G12-1

— Text name of the gesture: 2-point left

— Text description of the gesture: a gesture of moving two POIs horizontally in a left direction in one stroke

— Graphic representation of the gesture shown in Figure 7:

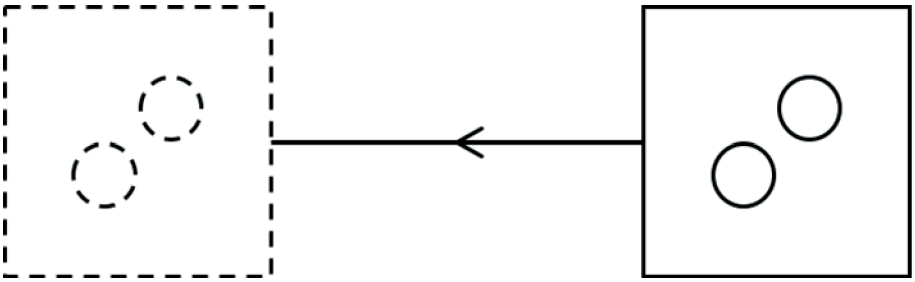

Figure 7 — Moving two POIs to the left direction in one stroke

— Number of states involved in the gesture: 3 (initial state, intermediate state, final state)

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7.1.2 State description

7.1.2.1 Mediated gesture

— Initial state

  — Order identifier of the state: 1

  — Starting position(s): on the surface of an input device (i.e. multi-touchpad) where a user performs the gesture

  — Movement(s) or condition(s): two POIs are on the surface of an input device and recognized by the device, and the pointer (or focus) is on the content window of an app which the gesture is applied to

  — Permitted variations: any relative position between the two POIs if the conditions above are satisfied

— Intermediate state

  — Order identifier of the state: 2

  — Starting position(s): the position of the two POIs in the initial state

  — Movement(s) or condition(s): moving the centre of the POIs horizontally in the “left” direction in one stroke

  — Permitted variations: any movement of the centre within 30 degrees of a horizontal axis in the “left” direction (any changes of the relative positions of the POIs during the movement is permitted if the centre moves in the “left” direction within 30 degrees of the variation)

— Final state

  — Order identifier of the state: 3

  — Starting position(s): the final position of the two POIs after the intermediate state

  — Movement(s) or condition(s): detaching one or all of the POIs from the surface or holding the POIs on the surface during a lapse of time

7.1.2.2 Direct touch gesture

— Initial state

  — Order identifier of the state: 1

  — Starting position(s): on the surface of an input device (i.e. touchscreen) where a user performs the gesture and in the content window of an app which the gesture is applied to

  — Movement(s) or condition(s): the two POIs are on the surface of the touchscreen and recognized by the device

  — Permitted variations: any relative position between two POIs if the conditions above are satisfied

— Intermediate state

  — Same as: Same as the intermediate state described in 7.1.2.1 (the mediated gesture of the 2-point left gesture)

— Final state

  — Order identifier of the state: 3

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- Starting position(s): the final position of the POIs after the intermediate state
- Movement(s) or condition(s): detaching one or all of the POIs from the surface

7.1.2.3 Non-contact gesture

- Initial state
  - Order identifier of the state: 1
  - Starting position(s): inside the detection space of an input device (i.e. camera) where a user performs the gesture
  - Movement(s) or condition(s): the two POIs are in the detection space of the device and are recognized by the device
  - Permitted variations: any relative position between the two POIs if the POIs are recognized by the input device
- Intermediate state
  - Same as: Same as the intermediate state described in 7.1.2.1 (the mediated gesture of the 2-point left gesture)
- Final state
  - Order identifier of the state: 3
  - Starting position(s): the final position of the POIs after the intermediate state
  - Movement(s) or condition(s): performing a pre-defined action

    EXAMPLE Activating a switch, going out from the detection area, performing a posture (as closed fist or open hand and so on) for finishing the gesture.

7.1.3 Specific instances with a direct touch gesture or a mediated gesture in applying “content-mover” metaphor

7.1.3.1 Horizontal scroll to the right

When the “2-point left” gesture, which is a direct touch gesture or a mediated gesture in applying the "content mover" metaphor, is used for horizontally scrolling content in the viewing window, the content should move along the gesture direction.

NOTE 1 The key of the “right arrow” is commonly used for the horizontal scroll to the right.

NOTE 2 In a direct touch environment, single-point gestures (i.e. the gestures of left, right, up and down in ISO/IEC 30113-11) are normally used for scrolling content in a viewing window.

7.1.3.2 Going to the next page

When the “2-point left” gesture, which is a direct touch gesture or a mediated gesture in applying the “content-mover” metaphor, is used for turning over pages in an application (a document reader, image viewer, etc.), the content viewer should show the "next" page.

NOTE 1 The key of “page down” is commonly used for going to the next page.

NOTE 2 In a direct touch environment, single-point gestures (i.e. the gestures of left, right, up and down in ISO/IEC 30113-11) are normally used for turning over pages of content.

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In the case of a web browser, the gesture should be used for the function for going to the native webpage viewed immediately before the “back” function was used.

NOTE 3 In Microsoft® MS Windows®, the key combination of “alt” and “right arrow” (alt +→) is commonly used for going to the next page. In macOS®, the key combination of “command” and “]” (command+]) or the key combination of “command” and “right arrow” (command+→) is commonly used for the same action.

7.1.4 Specific instances with a mediated gesture in applying “window-mover” metaphor

7.1.4.1 Horizontal scroll to the left

When the “2-point left” gesture, which is a mediated gesture in applying the “window-mover” metaphor, is used for horizontally scrolling content in the viewing window, the content should move in opposition to the gesture direction.

NOTE The key of “left arrow” is commonly used for the horizontal scroll to the left.

7.1.4.2 Going to the previous page

When the “2-point left” gesture, which is a mediated gesture in applying the “window-mover” metaphor, is used for turning over pages in an application (a document reader, image viewer, etc.), the content viewer should show the "previous" page.

NOTE 1 The key of “page up” is commonly used for going to the previous page.

In the case of a web browser, the gesture should be used for the function of going to the native webpage viewed immediately before the current one.

NOTE 2 In Microsoft® Windows®, the key of “backspace” or the key combination of “alt” and “left arrow” (i.e. alt+←) is commonly used for going to the previous page. In macOS®, the key combination of “command” and “[” (command+[) or the key combination of “command” and “left arrow” (command+←) is commonly used for the same action.

7.2 The “2-point right” gesture

7.2.1 General

The parameters for the “2-point right” gesture are:

— Unique (internal) identifier: G12-2

— Text name of the gesture: 2-point right

— Text description of the gesture: a gesture for moving two POIs horizontally along a right direction in one stroke

— Graphic representation of the gesture shown in Figure 8:

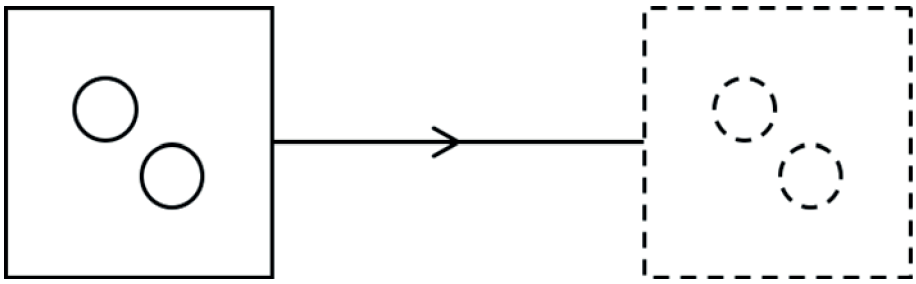

Figure 8 — Moving two POIs in the right direction in one stroke

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