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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS, INTERNET OF THINGS AND SMART CITIES

Use cases of user-centric work space service

ITU-T Y-series Recommendations – Supplement 42

International Telecommunication Union

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Supplement 42 to ITU-T Y-series Recommendations

Use cases of user-centric work space service

Summary

By orchestrating local and/or remote ICT resources, user-centric work space (UCS) service can provide a personalized work space. Instances of ICT resources that UCS can orchestrate include file, printer, monitor and keyboard.

With UCS service, smart devices, such as smart phones and smart pads, can utilize local and/or remote ICT resources to configure the user's own work space.

Supplement 42 to ITU-T Y-series Recommendations provides a description of the UCS concept and its associated enhanced user experience. Also, this Supplement provides use cases of UCS service to illustrate how this service can be implemented.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T Y Suppl. 42	2016-08-05	20	11.1002/1000/13024

Keywords

Internet of things, IoT, personalized work environment, UCS, user-centric work space.

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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1 Scope

This Supplement defines use cases for user-centric work Space (UCS) service. This Supplement addresses:

– Overview of UCS service;

– Enhanced user experience with UCS service;

– Use cases of UCS service.

2 References

[ITU-T Y.4000] Recommendation ITU-T Y.4000/Y.2060 (2012), *Overview of the Internet of things*.

[ITU-T Y.4101] Recommendation ITU-T Y.4101/Y.2067 (2014), *Common requirements and capabilities of a gateway for Internet of things applications*.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 thing [ITU-T Y.4000]: With regard to the Internet of things, this is an object of the physical world (physical things) or the information world (virtual things), which is capable of being identified and integrated into communication networks.

3.1.2 device [ITU-T Y.4000]: With regard to the Internet of things, this is a piece of equipment with the mandatory capabilities of communication and the optional capabilities of sensing, actuation, data capture, data storage and data processing.

3.1.3 gateway [ITU-T Y.4101]: A unit in the Internet of things which interconnects the devices with the communication networks. It performs the necessary translation between the protocols used in the communication networks and those used by devices.

3.2 Terms defined in this Supplement

This Supplement defines the following terms:

3.2.1 user-centric work space (UCS): A personalized work environment configured by orchestrating local and/or remote ICT resources.

3.2.1 UCS service: A service providing UCS to service users.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

A/V Audio/Video

ICT Information and Communication Technology

UCS User-centric work Space

5 Conventions

None.

6 Overview of user-centric work space

Often, a smart device is used as a personalized work environment anywhere and at any time because it has its own processing power and storage. The advantage of a smart device is its portability; to increase its portability, the size of a smart device tends to be small. However too small UIs caused by such small size make sometimes it difficult to work with applications, word processor for instance.

To satisfy portability as well as usability, existing problems can be overcome by orchestrating near-by and/or remote ICT resources in order to configure one's own work environment; for example, if there are available nearby office devices (such as monitor, keyboards, printers, facsimiles, etc.) that are allowed to be used, a user can borrow those devices as if his/ her own with the aid of such orchestrating capabilities. This Supplement describes such personalized work environment called user-centric work space (UCS).

Figure 1 depicts the concept of user-centric work space (UCS) which can be used as a personalized work environment.

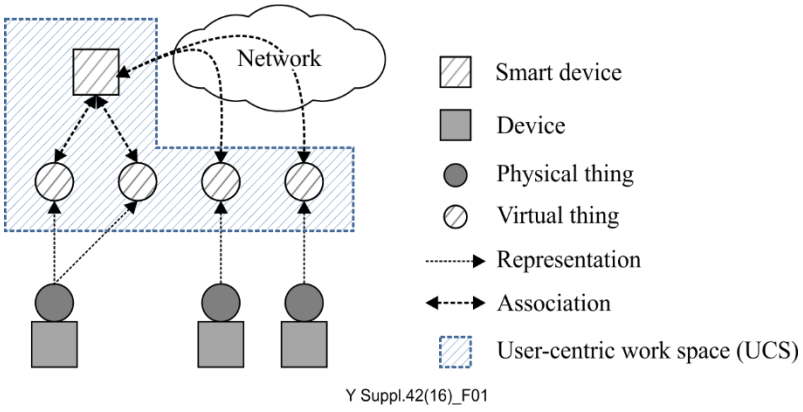

Figure 1 – The concept of user-centric work space (UCS)

UCS can be provided by the UCS service to the service user by orchestrating one or more ICT resources and associating them with the service user's smart device.

The UCS service regards the ICT resources as service capabilities offered by a device. As a device may have one or more service capabilities (for instance, an all-in-one printer which has printing, scanning and other service capabilities), each service capability offered by the device can be mapped into one or more ICT resources. In this Supplement, the ICT resources are regarded as virtual things and the service capabilities offered by the device are regarded as physical things [ITU-T Y.4000].

Figure 2 presents three ways of configuring UCS.

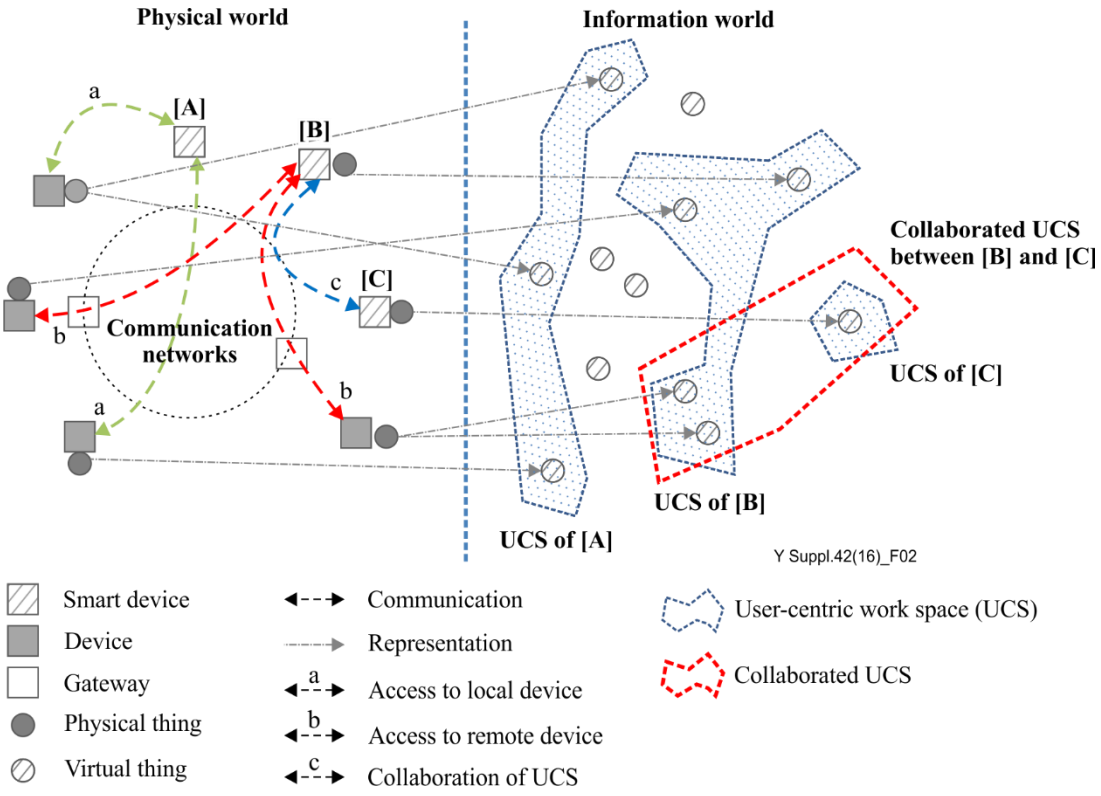

Figure 2 – Three ways of configuring UCS

The three ways of configuring UCS are:

– When a user wants to configure UCS with local ICT resources, requiring access to local devices (in both wired and wireless manner), the user communicates with devices in the physical world in order to orchestrate virtual things in the information world. An example of such a way of configuring UCS is shown by UCS of smart device [A] in Figure 2.

– When a user wants to configure UCS with remote ICT resources (e.g., hard disk, web camera and fax in other location), requiring access to remote devices, the user communicates with devices in the physical world via gateway in order to orchestrate virtual things in the information world. An example of such a way of configuring UCS is shown by UCS of smart device [B] in Figure 2.

– When a user wants to configure UCS with ICT resources which are already involved in another UCS (e.g., to access printing services not available in his/her own UCS), requiring then the collaboration of UCSs, the user communicates with the other UCS's smart device in the physical world in order to share virtual things in the information world between the two UCSs. An example of such a way of configuring UCS is shown by the collaborated UCS shown in Figure 2.

7 Enhanced user experience with UCS service

Figure 3 shows a current typical work environment. At every place visited by a user, he/she faces different work environments: at home he/she uses his/her home PC, at office he/she uses an office PC, and at a café he/she uses a smart phone. If the user wants to continue to use the services offered by his/her work environment, for example word processing, then he/she needs to re-configure the work environment by installing new software.

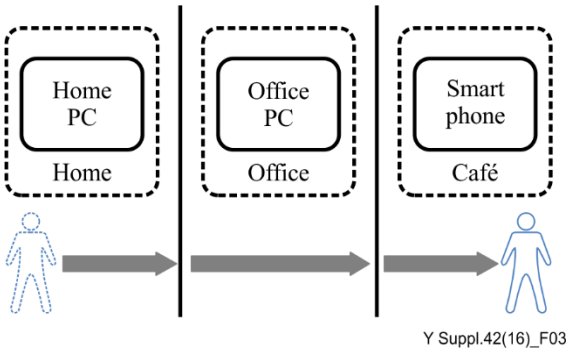

Figure 3 – Discontinuous user experience with UCS service

Figure 4 shows a work environment with UCS service capabilities. UCS configured by UCS service capabilities provides its service users with continuous work environment wherever he/she is. Once UCS is configured, a user does not need to install new software to continue to use his/her work environment.

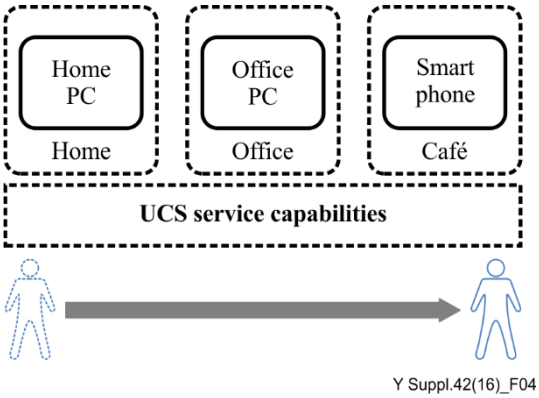

Figure 4 – Continuous user experience with UCS service

8 Use cases of UCS service

Based on the UCS service capabilities described in clause 6, this clause presents several tangible use cases of UCS service.

8.1 Nomadic office work environment

8.1.1 Scenario

Figure 5 shows a scenario where a UCS can be used as a nomadic office work environment.

Alice and Bob, in business partnership, have a business meeting in Bob's office. Alice brings her smart device capable of UCS service capabilities to Bob's office; Bob's office is equipped with an extra-wide monitor, keyboard and printer, which can be used freely by visitors. Alice brings in her smart device a business contract document to be reviewed with Bob, but Alice has still not finished her final modifications in that document.

Alice tries to find any available peripheral devices to configure her own work environment. Once found, Alice connects her smart device to the available peripheral devices wirelessly, in order to configure her UCS. After the successful UCS configuration completion, Alice can make her final modifications in the business contract document.

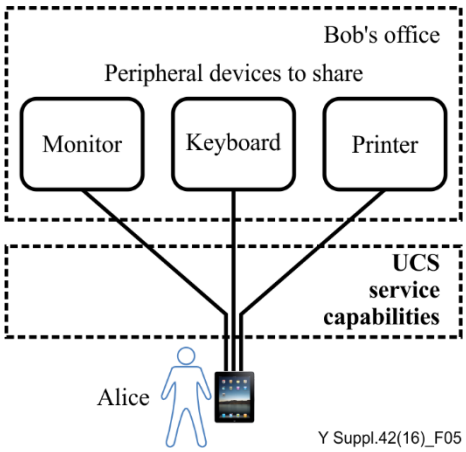

Figure 5 – Scenario of nomadic office work environment

8.1.2 Service flow

In this scenario, Alice has her UCS consisting of a wide monitor and a printer as output means, and a keyboard as input means. Figure 6 shows the service flow for the nomadic office work environment use case.

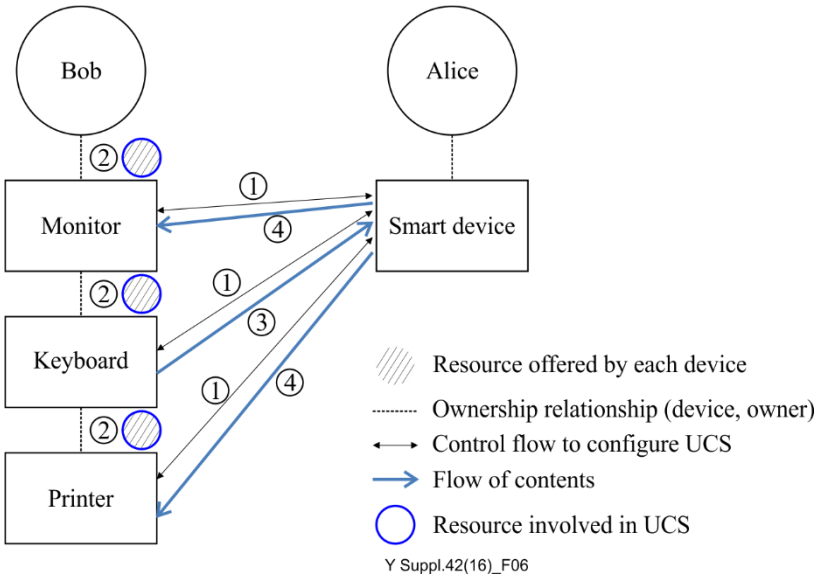

Figure 6 – Service flow for nomadic office work environment

1 Alice discovers available ICT resources offered by peripheral devices (monitor, keyboard and printer).

2 Alice selects available ICT resources and connects to the selected ones.

3 Alice uses the keyboard as her input means.

4 Alice uses the monitor and printer as her output means.

After the successful procedure completion, Alice can have her own UCS as described in clause 6.

8.2 Car infotainment

8.2.1 Scenario

Figure 7 shows a scenario where a UCS can be applied for the car infotainment environment. Alice takes Bob's car; Alice sits in the back seat and wants access to a car infotainment system, such as the car A/V system and backseat display.

Alice asks Bob's permission to have access to the car's A/V system and headrest display in order to configure her own UCS. Once Bob has given the permission, Alice connects her smart device, which contains a number of different types of entertaining content, to the available ICT resources offered by peripheral devices wirelessly. After the successful UCS configuration is completed, Alice can play some entertaining content stored on her smart device using Bob's car A/V system and headrest display as if they were her own.

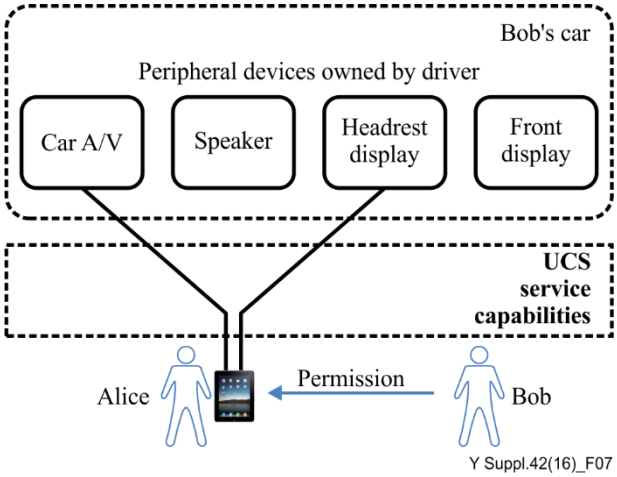

Figure 7 – Scenario of car infotainment

8.2.2 Service flow

In this scenario, the UCS consists of Alice's mobile device as an A/V content source and controller, car A/V system and headrest display as output means. Figure 8 shows a high-level service flow for car infotainment use case.

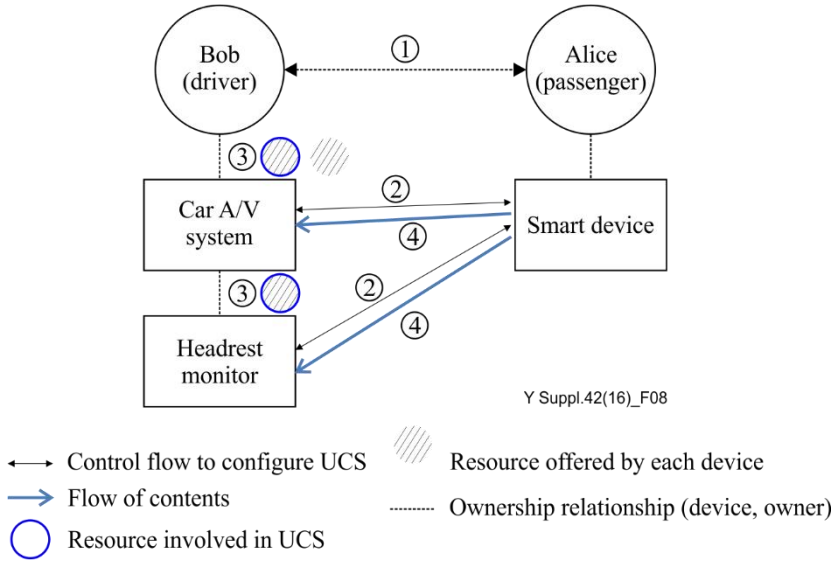

Figure 8 – Service flow for car infotainment

1 Alices asks Bob's permission to use ICT resources offered by peripheral devices (for car A/V system and headrest monitor) and Bob grants Alice the use of his ICT resources.

2 Alice discovers available ICT resources offered by each peripheral device (car A/V system and headrest monitor as output peripheral devices).

3 Alice selects available ICT resources and connects to the selected ones.

4 Alice uses the connected ICT resources as output means.

After the successful procedure completion, Alice can have her own UCS as described in clause 6.

8.3 Meeting room environment

8.3.1 Scenario

Figure 9 shows the use case of UCS in a meeting room equipped with a beam projector and a screen, and three people (Alice, Bob and Convenor) starting a brain-storming meeting.

At the beginning, the convenor discovers an available beam projector with UCS service capabilities and connects his/her smart device to the beam projector to announce the meeting agenda. After the meeting starts, each participant connects to the beam projector in turn. During the meeting, Alice needs a presentation file situated at home. Alice then accesses the file system at home and includes the required presentation file in her UCS.

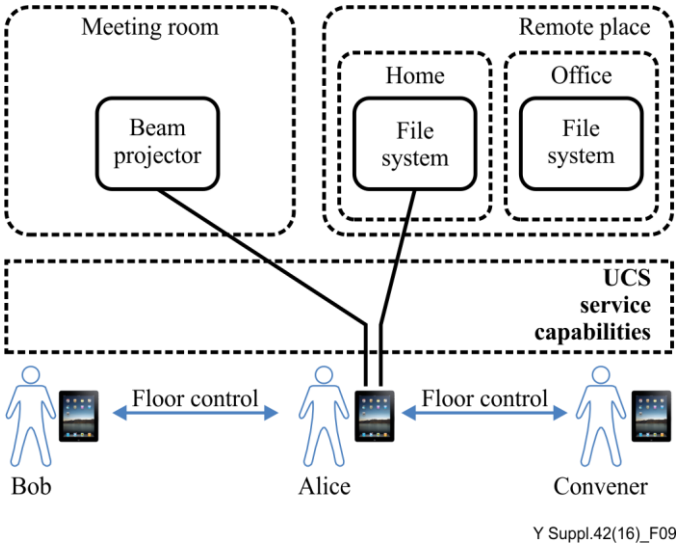

Figure 9 – Scenario of sharing beam project in meeting room

8.3.2 Service flow

In this scenario, the UCS consists of a beam projector as an output means, a file system at home as a content source. Figure 10 shows a high-level service flow for the meeting room use case.

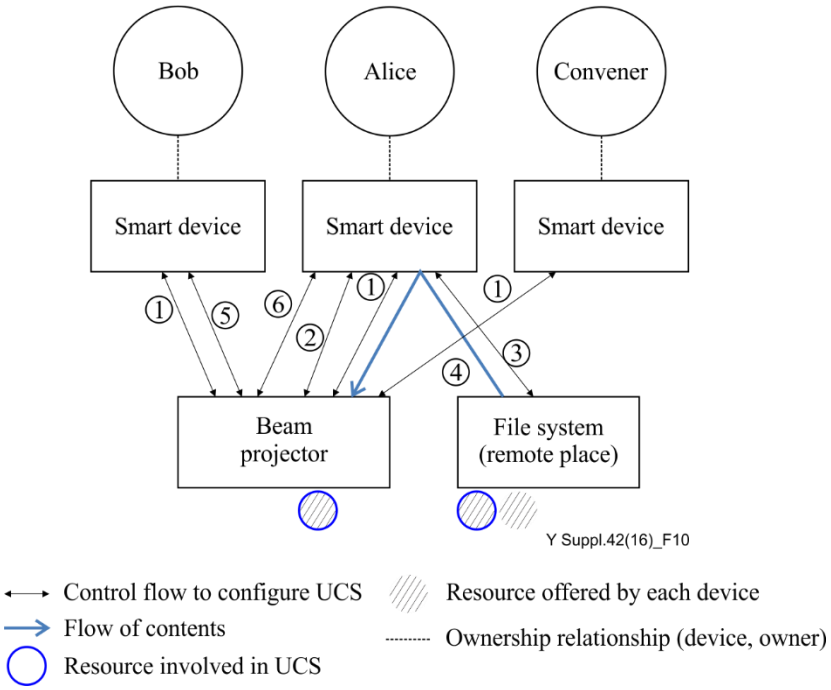

Figure 10 – Service flow for meeting room

1 The meeting participants, Alice, Bob and Convener, discover available the ICT resource offered by a beam projector and then select the available one.

2 Alice connects to the ICT resource offered by the beam projector as an output means. As a result, Alice occupies the ICT resource offered by the beam projector for the time being.

3 Alice connects to a file system for a presentation file (resource) in the remote place, at home.

4 Alice reads the presentation file at home; modifies the presentation file to fit the project screen and then projects the image on the screen.

After the successful completion of the procedure, Alice can have her own UCS as described in clause 6.

Meanwhile, each participant has to use the beam projector in turn in this scenario; therefore, the capability of exchanging resource occupation is needed.

5 Bob requests the ICT resource offered by the beam projector and asks Alice to yield occupation of the ICT resource offered by the beam projector.

6 Alice releases the ICT resource offered by the beam projector and Bob uses the Beam projector as his output means.

After the successful completion of the procedure, Bob has his own UCS consisting of Bob's smart device and beam projector, although the beam projector is owned by Alice.

8.4 Collaboration with other UCSs

8.4.1 Scenario

Figure 11 shows the scenario of UCS collaboration. UCS enables a group of users to share their personal ICT resources with others to make UCS expandable. Contrarily from the scenario discussed above where ICT resources consisting of UCS are occupied temporarily, in UCS collaboration, a user can register ICT resources permanently.

UCS enables a user to register his/her ICT resources for personal, public, or specific users; UCS also enables a user to decide whether or not his/her shared ICT resources can be accessed by others.

An owner wanting to share his/her ICT resources registers his/her intention to the UCS service repository, and the UCS service repository lists available ICT resources as well as their access conditions.

A UCS service user wanting a collaboration service acquires the list of shared ICT resources provided by the UCS service repository, and then, according to the access conditions, he/she tries to connect to specific ICT resources; once the ICT resources are successfully connected, the ICT resources are registered to the UCS service repository for future use as if they were his/her own.

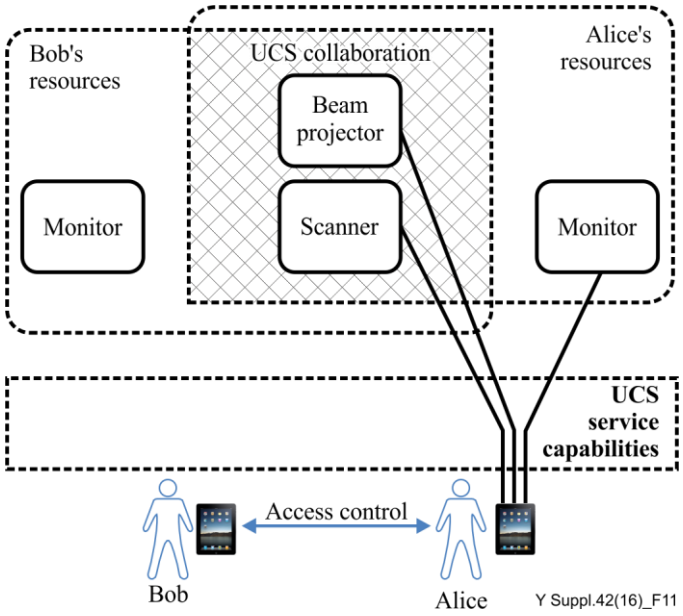

Figure 11 – Scenario of UCS collaboration

8.4.2 Service flow

This scenario described in clause 8.4.1 shows how Alice's UCS, which consists of only one ICT resource offered by a monitor, can expand to include more ICT resources offered by the beam projector as well as the scanner which belong to Bob's UCS; and then Alice and Bob can use the ICT resources offered by beam projector and scanner at the same time. Figure 12 shows a high-level service flow for the UCS collaboration use case.

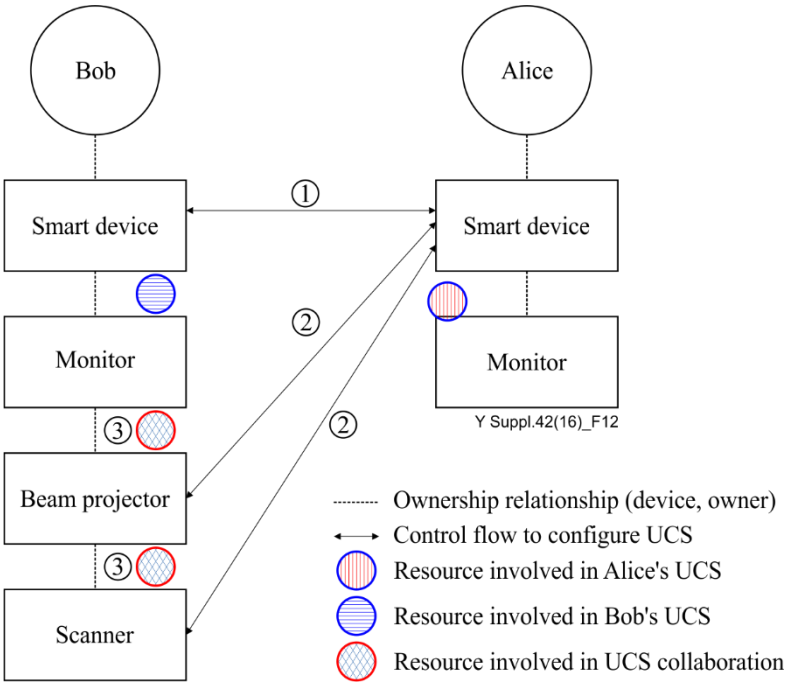

Figure 12 – Service flow for UCS collaboration

Before starting collaboration, each UCS service user runs his/her own UCS.

1 Upon Alice's request, the UCS service discovers Bob's available ICT resources for UCS collaboration. Bob allows Alice's usage of the ICT resources offered by the beam projector and scanner.

2 With Bob's permission, Alice selects available ICT resources and connects to the selected ones (beam projector and scanner), which are part of Bob's UCS.

3 Alice uses the connected ICT resources as output means.

After the successful completion of the procedure, the two UCSs belonging to Alice and Bob can collaborate as described in clause 6.

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