

International Telecommunication Union

**ITU-T**

TELECOMMUNICATION  
STANDARDIZATION SECTOR  
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**F.743.15**

(03/2022)

SERIES F: NON-TELEPHONE TELECOMMUNICATION  
SERVICES

Multimedia services

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**Requirements for multi-operator core network  
enabled multimedia services**

Recommendation ITU-T F.743.15

ITU-T



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# Recommendation ITU-T F.743.15

## Requirements for multi-operator core network enabled multimedia services

### Summary

Recommendation ITU-T F.743.15 specifies the requirements for multi-operator core network (MOCN) enabled multimedia services (MOCN-MS). This Recommendation not only defines a high-level functional framework of MOCN enabled multimedia services, but also specifies the sharing capability information unit (SCIU) function requirements and MOCN-MS system requirements according to this framework. In addition, several scenarios for MOCN enabled multimedia services are provided in this Recommendation.

MOCN enabled multimedia service defined in this Recommendation can improve the conventional multimedia service quality by taking advantage of the network sharing capability of the co-construction network, without bringing any additional impact on the base station. The MOCN enabled multimedia service providers (SP) will benefit from the requirements and reference framework defined in this Recommendation. This way the extension and optimization of the existing multimedia service can be estimated efficiently. In addition, it is possible for the multimedia service provider to discover and develop new features while the MOCN-MS is employed.

### History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T F.743.15	2022-03-16	16	<a href="http://handle.itu.int/11.1002/1000/14956">11.1002/1000/14956</a>

### Keywords

Co-construction network, MOCN, multimedia services (MS), multi-operator core network.

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\* 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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# Recommendation ITU-T F.743.15

## Requirements for multi-operator core network enabled multimedia services

### 1 Scope

This Recommendation specifies the requirements of multi-operator core network enabled multimedia services.

The scope of this Recommendation includes:

- High-level functional framework of MOCN enabled multimedia services;
- SCIU function requirements for MOCN enabled multimedia services;
- System requirements for MOCN enabled multimedia services;
- MOCN enabled multimedia services scenarios.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

None.

### 3 Definitions

#### 3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

**3.1.1 multi-operator core network (MOCN)** [b-3GPP TS 23.501]: MOCN is one of the co-construction network architectures. It is a radio access network (RAN) sharing-based solution that allows two or more core networks to use a shared RAN.

#### 3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

**3.2.1 operations and maintenance centre – RAN (OMC-R)**: In mobile networks, an operations and maintenance centre – RAN is the central location to operate and maintain the radio access network (RAN). OMC-R can provide wireless network data to applications through northbound interfaces.

**3.2.2 sharing capability information (SCInfo)**: The information about the capabilities of the shared network.

**3.2.3 sharing capability information unit (SCIU)**: A platform used to collect the network information provided by all shared network elements, and generate the SCInfo for the multimedia service platforms and/or edge multimedia service platforms to optimize the multimedia service in the co-construction and sharing networks.

## 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

5GC	5G Core
AR	Augmented Reality
MNO	Mobile Network Operator
MOCN	Multi-Operator Core Network
MS	Multimedia Service
NSA	Non-Standalone
OMC-R	Operations and Maintenance Centre – RAN
PLMN	Public Land Mobile Network
QoS	Quality of Service
RAN	Radio Access Network
SA	Standalone
SCIU	Sharing Capability Information Unit
SLA	Service Level Agreement
SP	Service Provider
UAV	Unmanned Aerial Vehicle
UE	User Equipment
UPF	User Plane Function
VR	Virtual Reality
WLAN	Wireless Local Area Network

## 5 Conventions

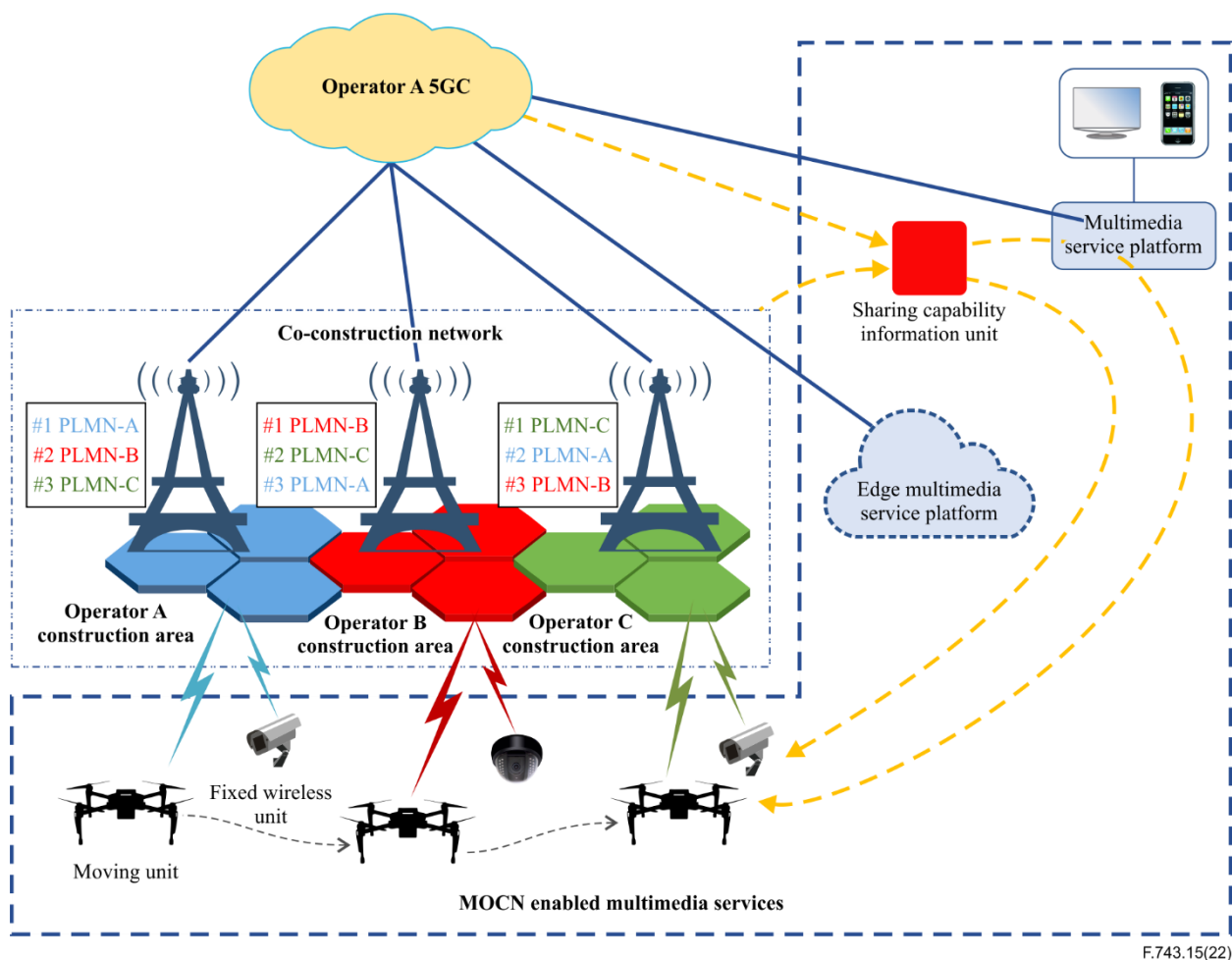
In this Recommendation:

- The keywords "is required to" indicate a requirement that must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.
- The keywords "is recommended" indicate a requirement that is recommended but which is not absolutely required. Thus, this requirement need not be present to claim conformance.
- The keywords "can optionally" and "may" indicate an optional requirement that is permissible, without implying any sense of being recommended. These terms are not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

## 6 Overview

MOCN is one of the co-construction network architectures proposed by other SDOs (e.g., MOCN in [b-3GPP TS 23.251]). A co-construction network is deployed by multiple operators in collaboration to jointly make use of network resources, which not only improves network capabilities but also reduces infrastructure investment for each operator. Figure 6-1 shows the overview of the multimedia services enabled by MOCN.





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**Figure 6-1 – The overview of the multi-operator core network enabled multimedia services**

Multi-operator core network enabled multimedia services, deployed in the co-construction network, are an extension of existing telecommunication services to handle at least two types of media in a synchronized way, where a co-construction network can take full advantage of the network resources of multiple operators involved in the construction and extend related service capabilities. The overview of such multimedia services is shown in Figure 6-1. The co-construction network contains several RAN areas, in which the base stations of the areas can broadcast public land mobile network (PLMN) IDs of all operators for network sharing.

In the example shown in Figure 6-1, a moving unit, which is a client of multimedia service is required to support multiple wireless data transmission technologies, and the media data and control signalling are required to transmit via two separate radio channels. With the deployment of MOCN, the SCInfo is generated by the SCIU and transferred to the multimedia service platform and/or the edge multimedia service platform (which is closer to the end-user), based on the request. The SCIU allows the multimedia service platform to acquire the shared network capabilities at different levels. Besides, the map of co-construction areas needs to be provided to reduce the switch latency of transmitting modes and handover delay in shared border areas. The distribution information of these sharable edge network elements also needs to be included in the SCInfo for the multimedia service platform, especially in some low-latency service application scenarios.

This comprehensive information may bring about a big chance in helping conventional multimedia service providers (SPs) to provide a more optimized service capability, such as more accurate bandwidth reservation, customized service for the specific user and dynamic quality of service (QoS) adjusting.

## **7 Requirements for multi-operator core network enabled multimedia services**

### **7.1 SCIU functional requirements**

#### **7.1.1 SCIU general requirements**

FUN-001: The SCIU component is required to provide a southbound interface to OMC-R to acquire all kinds of RAN sharing information in the MOCN.

FUN-002: The SCIU component is required to provide a northbound interface to the multimedia service platform to provide SCInfo for a multimedia service platform.

FUN-003: The SCIU component is recommended to support management of the collected network information, such as creating, deleting and updating.

FUN-004: The SCIU is recommended to be able to process massive requests from the multimedia service platforms with reasonable and acceptable response time to fulfil specific performance requirements. These requirements may include response time, efficiency, information format, information type and precision.

FUN-005: The SCIU is recommended to provide a failure recovery mechanism to maintain services if certain functions become unavailable.

FUN-006: The SCIU proxy can optionally be used for exposing the SCIU information to the upper-layer service. It can be implanted as an open network capability function, such as IMT-2020 (5G) NEF (network exposure function) or a dedicated interface.

#### **7.1.2 Sharing information collection**

FUN-007: The SCIU component is required to support the collection of all shared network elements and all shared network information provided by co-construction operators on demand.

FUN-008: The SCIU component is recommended to acquire the types of shared radio access technologies in each operator's co-construction area, such as IMT-Advanced (4G), IMT-2020 (5G) and wireless local area network (WLAN).

FUN-009: The SCIU component is recommended to acquire the available radio frequency, radio bandwidth and radio resource priority of each shared RAN area.

FUN-010: The SCIU component is recommended to acquire the distribution information of available shared edge network elements, including network locations and adjacency relationships of the shared edge nodes.

FUN-011: The SCIU component is recommended to acquire the map of co-construction network deployment, especially including the map of borders between different shared networks.

FUN-012: The SCIU component is recommended to acquire the statistical network load information of the shared networks.

FUN-013: The SCIU component is recommended to support the collection of the co-construction network deployment information and some sharing policies enforced by operators.

#### **7.1.3 Sharing information process**

FUN-014: The SCIU component is required to process all kinds of shared network information to generate SCInfo.

FUN-015: The SCIU component is recommended to be capable of categorizing the network sharing capability at different levels in terms of the features such as capacity, coverage and delay. These sharing capability levels are defined as available network resource priorities in different operators' co-construction areas.

#### **7.1.4 SCInfo storage/cache**

FUN-016: The SCIU component is recommended to be capable of storing the network information from all shared network elements and co-construction operators on demand.

FUN-017: The SCIU component is recommended to encrypt SCInfo to protect the essential network operator information, and sensitive information collected from the shared networks. Appropriate methods should be deployed to prevent attacks targeted at the SCIU.

FUN-018: The SCIU component is recommended to duplicate SCInfo in the cloud to avoid data loss or modification.

#### **7.1.5 SCInfo requirements**

FUN-019: The network SCInfo is recommended to support the indication of the types of shared radio access technologies in each operator's co-construction area, such as IMT-Advanced (4G), IMT-2020 (5G) and WLAN. In addition, the information on shared IMT-2020 (5G) radio access technologies are recommended to refer to the non-standalone (NSA) mode or standalone (SA) mode.

FUN-020: The network SCInfo is recommended to contain the available radio frequency, radio bandwidth and radio resource priority of each shared RAN area.

FUN-021: The network SCInfo is recommended to contain the distribution information of available shared edge network elements, including network locations and adjacency relationships of the shared edge nodes.

FUN-022: The network SCInfo is recommended to contain the map of co-construction network deployment, especially including the map of borders between different shared networks.

FUN-023: The network SCInfo is recommended to contain the statistical network load information of the shared networks.

FUN-024: The network SCInfo can optionally be provided in the formats specified by multimedia service platforms or edge multimedia service platforms.

### **7.2 MOCN-MS system requirements**

#### **7.2.1 General requirements**

FUN-025: A MOCN-MS system is recommended to be capable of providing a unified multimedia service to an operator's subscriber that are connected either to an operator independent network or a multi-operator core network.

FUN-026: A MOCN-MS system is recommended to provide continuous service for the end-users when commanding handover between operator independent network and multi-operator core network or between different multi-operator core networks.

FUN-027: A MOCN-MS system is recommended to be able to identify the different operator's subscribers who are connected to the multi-operator core network.

#### **7.2.2 Network management function**

FUN-028: Network management function is recommended to be able to retrieve the SCInfo from SCIU via an open interface or an SCIU proxy.

FUN-029: Network management function is recommended to be able to retrieve the customized SCInfo based on the specific operator's identification.

FUN-030: Network management function is recommended to be able to transfer the retrieved SCInfo to the multimedia application function via a pre-defined internal interface, based on the SCInfo query.

FUN-031: The network SCInfo is recommended to be cached in the local entities of the network management function to avoid frequent querying.

### 7.2.3 Multimedia application function

FUN-032: Multimedia application function is recommended to be able to retrieve the SCInfo from the network management function.

FUN-033: Multimedia application function is optional to be able to retrieve the SCInfo from SCIU via an open interface or an SCIU proxy.

FUN-034: Multimedia application function is recommended to be able to provide or adjust the service capability at different levels related to its corresponded SLA, based on the SCInfo.

FUN-035: If the multimedia application function is implemented as the virtualized network application, the service capability is optional to be adjusted by changing the virtual hardware/software resource, based on the SCInfo.

FUN-036: Multimedia application function is recommended to have the capability of scheduling the service request to the most appropriate service node according to the SCInfo.

FUN-037: Multimedia application function is optionally able to create or change traffic routing policy, which is applied on the routing device, according to the SCInfo, to offload its service traffic into the edge network.

FUN-038: Multimedia application function is recommended to have the capability of migrating services between different multimedia service platforms to ensure service continuity when user equipments (UEs) switch to MOCN areas.

## 8 High level MOCN-MS functional framework

According to the overview of the MOCN enabled multimedia service shown in Figure 6-1, a MOCN-MS system is composed of four components, which include the end-user, MOCN, SCIU and MOCN-MS platform. The high-level MOCN-MS functional framework is illustrated in Figure 8-1.

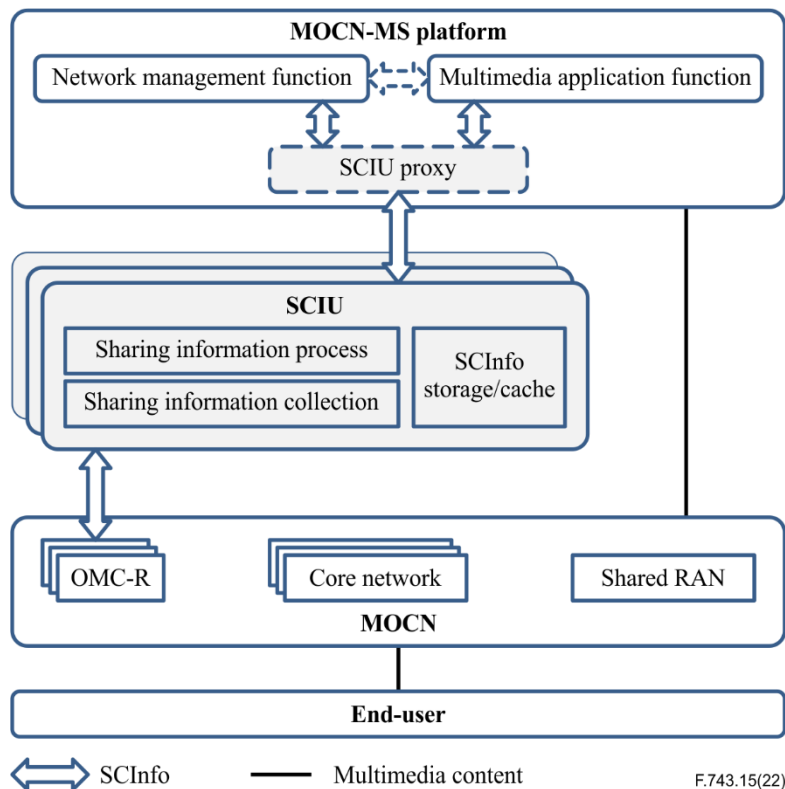


Figure 8-1 – The high-level MOCN-MS functional framework

Basically, the MOCN-MS platform contains a multimedia application function, network management function and probably an SCIU proxy. The multimedia application function is responsible for delivering various types of multimedia services and content over the co-construction network, such as audio / video service and web service. According to the current deployment cases, a MOCN area may have multiple operator-dedicated multimedia service platforms severed for the different operator's subscribers and they are isolated from each other. The network management function, especially in this Recommendation, is responsible for the MOCN status monitoring and MOCN information retrieving. The multimedia application function can directly obtain the SCInfo from SCIU or interact with the network management function to obtain the SCInfo if the network capacity is not intended to be exposed to the upper-layer applications. The SCIU proxy is able to transfer the SCInfo from the SCIU to the MOCN-MS platform. According to the SCInfo, the multimedia application function can select the most appropriate service mode or optimize its service quality, for example, to limit the maximum connection and bandwidth based on the local MOCN status.

The SCIU component is responsible for collecting and processing the shared network capability information from the MOCN and providing accurate and reliable SCInfo for the multimedia service platform. SCIU contains shared information collection functions, shared information process and SCInfo storage/cache functions. The shared information collection function is responsible for collecting the underlying network information related to network sharing in MOCN. The shared information process function is responsible for the processing of acquired sharing network information and generating SCInfo. SCInfo storage/cache function is responsible for storing or caching SCInfo in SCIU, avoiding frequent data acquisition and processing from OMC-R.

It is noted that, in practice, there are possible multiple SCIU functional entities existing by associating with the different MOCNs, which belong to the different operators or regions.

MOCN is a co-construction network and is responsible for providing a shared access network for the end-users which can be the subscribers belonging to the different operators. The MOCN comprises a shared RAN, associated with multiple independent core networks and OMC-Rs. The shared networks can be deployed by different operators in co-construction areas. Compared with the operator dedicated network, the MOCN can provide different levels of resources and service capabilities based on the agreements between operators.

The end-user function represents the multiple types of devices, e.g., personal computer, intelligent mobile device, augmented reality (AR) / virtual reality (VR) device and unmanned aerial vehicle (UAVs) with a camera, which is authorized to access MOCN and obtain multimedia services.

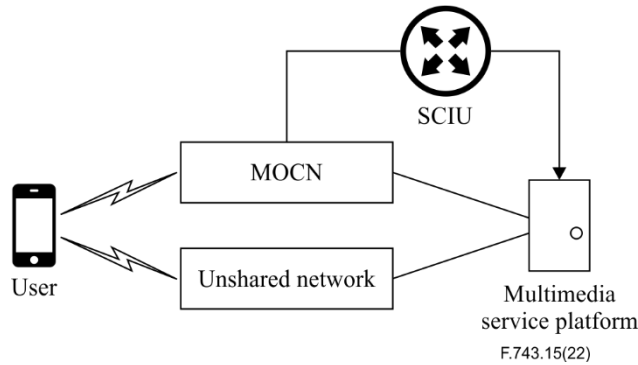
# Appendix I

## Scenarios

(This appendix does not form an integral part of this Recommendation.)

This clause describes various scenarios for multi-operator core network enabled multimedia services.

### I.1 User moving through MOCNs and unshared networks



**Figure I.1 – User moving through MOCNs and unshared networks**

MOCN is a RAN sharing solution that allows two or more operators' core networks to use the same RAN. MOCN can aggregate multiple operators' resources to achieve better network performance. Users in the unshared network and the MOCN usually have different SLAs (service level agreements). Figure I.1 shows an example of a user moving through MOCNs and unshared networks. When the users move from an unshared network to the MOCN, the multimedia platform needs to acquire SCInfo, which contains the shared network capability information with the corresponding level of service.

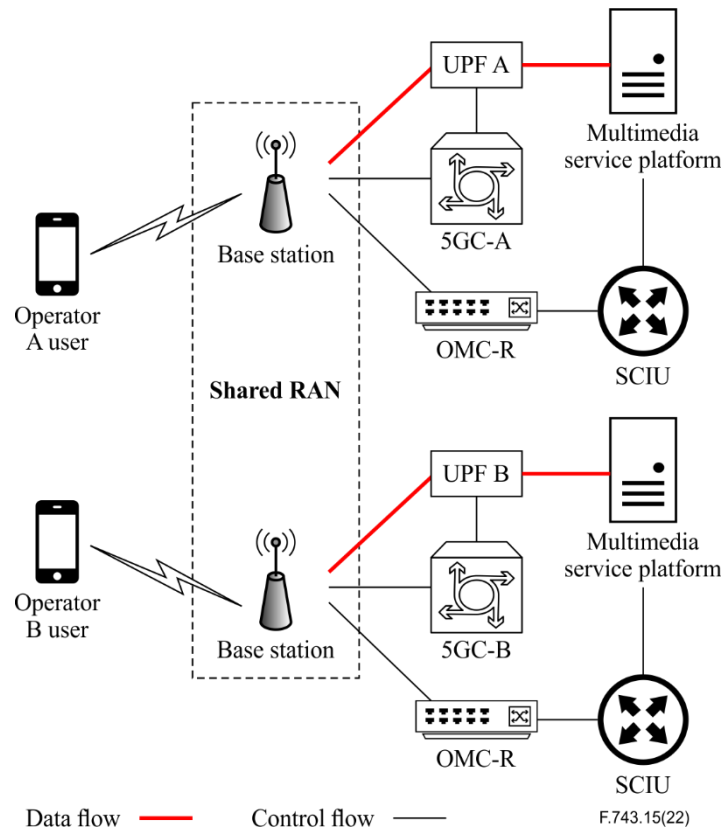
Level	Capacity	Delay	Coverage	...
1			√	
2	√			
3		√		
4				√
5				
...				

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**Figure I.2 – Example table of sharing capability information**

In this scenario, SCIU is deployed to obtain the shared network information from the RAN side and generates SCInfo for the multimedia server platform. Figure I.2 shows an example of SCInfo. SCInfo contains the levels of resource allocation that a shared network can provide such as capacity, delay, coverage, etc. The multimedia service platform acquires the SCInfo and then adjusts the QoS (quality of service), such as video resolution and round-trip time and can be adaptively adjusted in advance to ensure the stability of the video stream transmission.

## I.2 MS platform associated with the Operator dedicated SCIU deployed in a MOCN

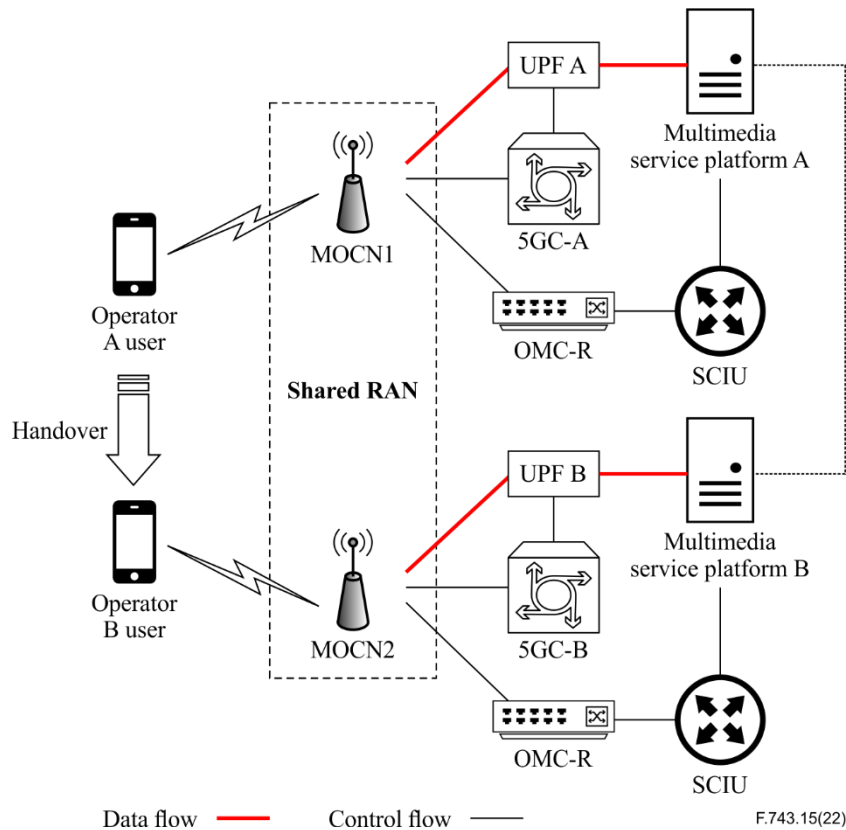


**Figure I.3 – Operator dedicated SCIU deployed in a MOCN**

In this scenario, the multimedia service platforms from different operators are independent from each other and the media data is transmitted over the corresponding operators' own user plane function (UPF). MNO (mobile network operator) can deploy the SCIU near the OMC-R (e.g., on the same server), so that the SCIU can efficiently acquire the shared network information from the OMC-R. This information will be processed and generated as a piece of accurate and reliable SCInfo for the multimedia service platform. SCInfo can be stored/cached in the SCIU and periodically updated.

Figure I.3 illustrates an example of an operator dedicated SCIU deployment for multimedia service in a MOCN. In the Figure, Operator-A user and Operator-B user are able to connect to the same MOCN but they might be attached to the different UPFs which are allocated by their registered 5G Core (5GCs). An Operator-A dedicated multimedia service platform can only provide a certain level of service to the Operator-A user by retrieving the shared network capability described from SCIU belonging to Operator A.

### I.3 User moving across different MOCNs



**Figure I.4 – User moving across the different MOCNs**

This scenario is very similar to the case described in Appendix I.2. In this scenario, MOCN1 and MOCN2 belong to the same Operator-A but they are built in the different geographic co-construction areas. The multimedia service platforms, which may be provided by the same SP, can be distributed, deployed and associated with the MOCN area.

Figure I.4 shows an example of a user moving across the different MOCNs. When the Operator-A user handover from MOCN1 to MOCN2, the current multimedia service status can be migrated from multimedia platform A to multimedia platform B in order to ensure the service continuity. But multimedia platform B should determine if the service level needs to be changed or not, according to the current SCInfo retrieved from SCIU in MOCN2.



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