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REAL-TIME COORDINATION BETWEEN SHARED SCHEDULERS IN AN O-RAN ARCHITECTURE

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ABSTRACT

Sharing of Radio Access Network (RAN) resources is set to become a typical deployment scenario for enterprise Fifth Generation (5G) radio access implementations in which a neutral host may offer a converged Open Radio Access Network (O-RAN) Radio Unit (O-RU) function that can be shared between an enterprise and multiple mobile network operators (MNOs), can be hosted by an enterprise via a converged O-RU that simultaneously supports multiple MNOs, or can be hosted by a service provider (SP), which can support an enterprise as well as one or more MNOs. Current solutions provide for the ability to facilitate dynamic sharing of resources using a near real-time RAN Intelligent Controller (RIC) that acts as an arbiter between different tenants sharing an O-RU in order to to support dynamic resource partitioning. However, as its name implies, a near real-time RIC is not suitable for real time dynamic sharing and is hence unable to operate when dynamic sharing needs to operate over very short durations, such as for a frame or sub-frame. Presented herein is a new section extension that can be implemented in an O-RAN fronthaul control-plane (C-Plane) in order to facilitate signaling exchanges necessary to support real-time dynamic sharing of O-RU resources.

DETAILED DESCRIPTION

The O-RAN Alliance is currently seeking to enhance the O-RAN architecture to support static partitioning of resources between tenants. This proposal defines a new section extension that can be implemented in the O-RAN fronthaul C-Plane in order to facilitate signaling exchanges necessary to support real-time dynamic sharing of O-RU resources, which may be useful in scenarios involving dynamic sharing over very short durations, such as resource sharing for a frame or sub-frame.

There are many use cases that drive requirements for sharing over short durations. In one example, dynamic spectrum sharing (DSS) defines the ability to re-use existing

Long Term Evolution (LTE) multicast-broadcast single frequency network (MBSFN) capabilities in order to be able to share a slot between New Radio (NR) and (LTE), where an MBSFN configuration, a sub-frame mask, and rate-matching are used to enable resource sharing. Such approaches allow LTE Channel State Information (CSI) reference symbols to continue to be transmitted during symbols allocated to NR.

In accordance with techniques of this proposal, an O-RU can be enhanced to indicate to an O-RAN Distributed Unit (O-DU) that it support the section extension for real-time arbitration. Conversely, an O-DU is able to indicate to an O-RE that it support the section extension for real time arbitration. Such a section indication is not currently supported in in O-RAN standards. Figure 1, below, is a call flow illustrating such communications between a shared O-RU and a number of O-DUs.

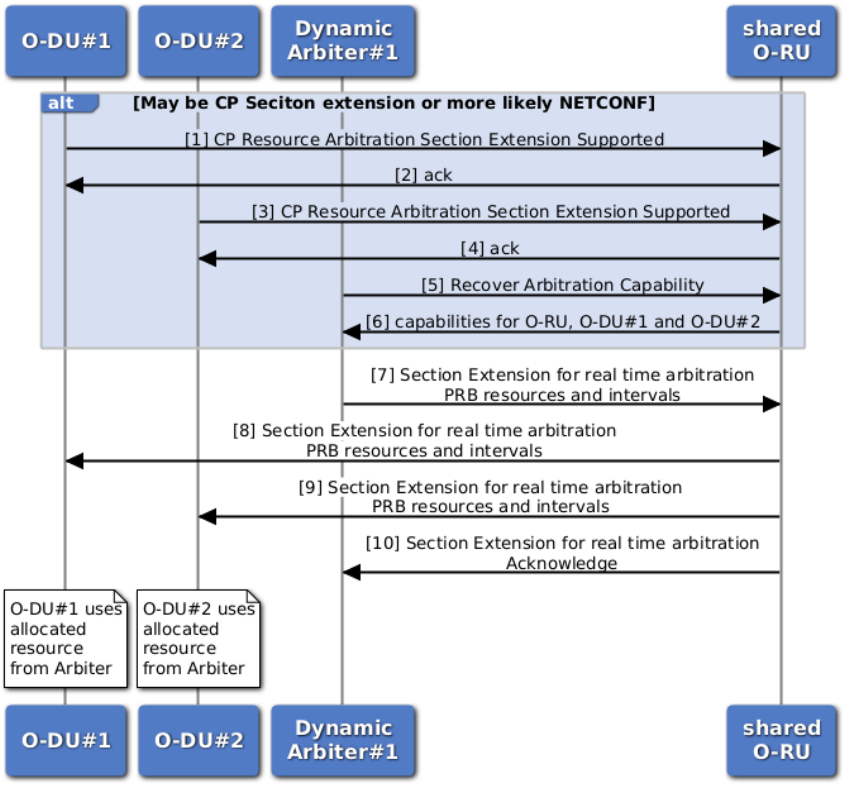

Figure 1: Exemplary Call Flow Illustrating O-RU, O-DU, and Arbiter Communications

As illustrated in Figure 1, a dynamic arbiter is able to recover the support of section extension for the shared O-RU and all corresponding O-DUs. Currently, O-RAN standards do not allow a function connected to an O-RU to recover capabilities of other elements

connected to the O-RU. The dynamic arbiter uses the newly-defined Open-Fronthaul section extension in order to dynamically and, in real-time, partition resources among the O-DUs. Thereafter, shared O-RU can use the uplink control-plane to indicate the same to attached O-DUs. Current solutions do not conceive of using the real-time fronthaul for sharing allocations). Further, current solutions only use the uplink control-plane for License-Assisted Access (LAA) operations.

Accordingly, techniques herein provide for the ability to facilitate real-time resource sharing in an O-RAN architecture through the use of a newly defines section extension, which can be used by a shared O-RU and O-DUs within a deployment to signal their support for real-time dynamic sharing of O-RU resources.