



Conflict Management

via E2 Guidance

DIRECT CONFLICT

29-Aug-2023

Conflict Manager-Overview:

- This module shall be responsible for identifying potentially overlapping or conflicting RAN control decisions from multiple xApps and provide guidance to them.
- E.g., the user needs to be moved from one cell to another due to high traffic load, while the other xApp at the same time may want to move the user back as the handover boundary change due to a high handover failure rate.
- In such a case the individual user will be „ping-ponged” between the two cells if we don't have a conflict mitigation function that looks at what's happening in the network and what impact the potential action may have on the network operation if being executed in the E2-Node. In such an example the conflict mitigation function's job is to align the potential actions to avoid such undesired behavior.

Supported Use case



Direct Conflicts: The conflicts can be observed directly by Conflict Manager. Supported Use case:

- Two or more xApps request different settings for the very same configuration of one or more parameters of a Control Target. Conflict manager processes the requests and provides guidance to the xApp.

E2 Guidance: xApp initiated conflict mitigation using E2 Guidance to obtain guidance from Conflict Manager to resolve potential conflicts prior to initiating a RIC function procedure;

- RIC Control using E2 Related API: E2 Guidance (request, response).

E2 Guidance

- The purpose of the xApp initiated E2 Guidance request/response API procedure in the Near-RT RIC is to allow xApp to obtain guidance from the Conflict Manager platform function prior to initiating an action.
- Guidance/Response from Conflict Manager shall include indication on whether or not the xApp proposed E2 Related API message or series of messages may result in a conflict with E2 related API messages from other xApps
- Messages shall be sent in JSON format over RMR in the E2 GUIDANCE PROCEDURE
- This procedure shall be optional for xApp

E2 Guidance APIs



E2_GUIDANCE_REQ

IE Name	Remarks
*ResourceType	This is an Enum to identify request type 0: UE, (1: CELL, 2: SLICE, 3: E2, 4: MISC) FUTURE
*TransactionID	This a 64bit integer, a unique identifier for a request. xApp will identify the response using this transaction ID. A combination of xApp ID(refer: xApp Authentication and authorization) and Transaction ID must be unique.
* ResourceID	Interface depend on “Type”, (eg:- For UE/Type 0 it is 64bit int AmfUENGAPID,)
* ParamList	List of configurable ran parameters control request supposed to update

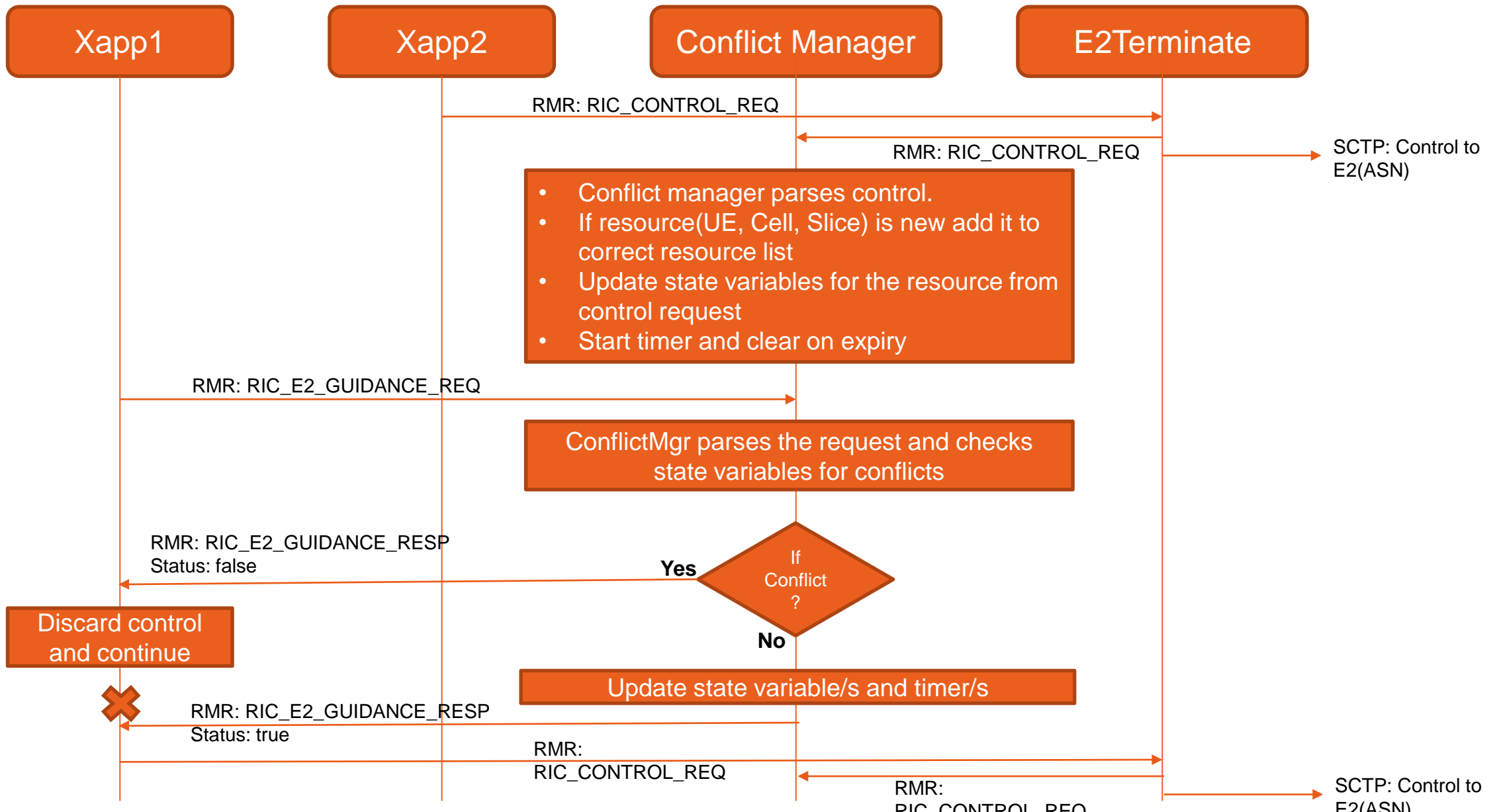
E2_GUIDANCE_RESP

IE Name	Remarks
*TransactionID	This a 64bit integer, a unique identifier for a request. xApp will identify the response using this transaction ID. A combination of xApp ID(refer: xApp Authentication and authorization) and Transaction ID must be unique.
*isRequestConflicting	Boolean – True: if sending control will not cause conflict and False: if sending control may cause a conflict
ConflictingParamList (Optional)	Optional (For xApp’ s debugging and logs) list of conflicting Ran Params
Cause (Optional)	Optional (For xapps debugging and logs) String explaining response or remark

Conflict Manager: Approach

- Conflict manager maintains a list of Resources (UEs, Cells, Slices etc) received in RIC_CONTROL_REQ and RIC_E2_GUIDANCE_REQ
- xApp may check with conflict manager before sending control request(optional).
- New RMR msg types RIC_E2_GUIDANCE_REQ, RIC_E2_GUIDANCE_RESP shall be defined
- All control messages from xapps shall be forwarded to conflict manager from E2 Terminator
- Conflict manager will be adding a state variables(for each parameter) to each UE, Cell and Slice.
- State variables are updated based on RIC_CONTROL_REQ and RIC_E2_GUIDANCE_REQ
- Current status of state variable shall determine the conflicting request
- State variable shall be cleared with after the timer expiry (configurable)

Conflict Manager: Workflow



Impact On Other Components

Component	Remarks
RMR	New message introduced E2_GUIDANCE_REQ 15001 E2_GUIDANCE_RESP 15002
E2Terminate	It needs to forward all control requests to ConflictMgr
xApp Framework	Add interface for E2_GUIDANCE_REQ and E2_GUIDANCE_RESP messages
Route Manager	Routes for E2_GUIDANCE_REQ and E2_GUIDANCE_RESP , route for forwarding RIC_CONTROL_REQ to Conflict Manager from E2T

To be planned...

- Current implementation supports E2SM-RC based Control Request, support for E2SM CCC based control to be added
- For indirect conflicts module need to find correlation between conflicting params and can update corresponding state variables for each control request. This is planned for future implementation

Thank you
Q&A