

Update of C2C-CC Requirements for NEMO Route Optimization

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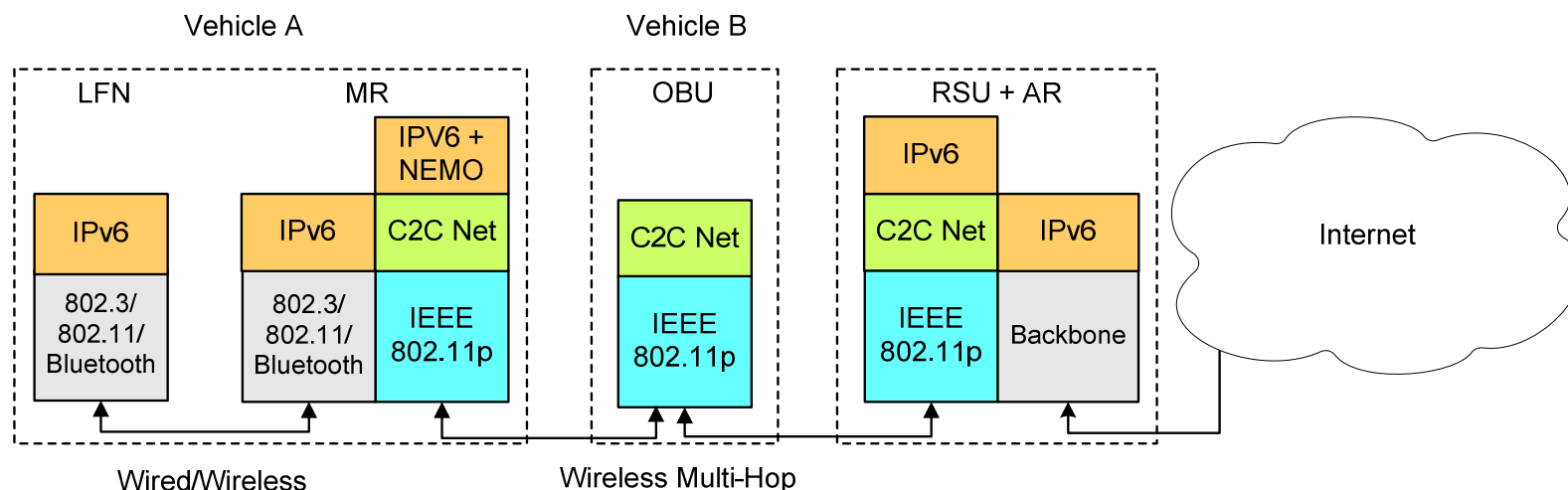
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Outline

- **Deployment Scenario**
- **Summary of Changes from -00**
- **RO Scenarios**
- **Requirements**
- **Conclusions**

Deployment Scenario

- NEMO to be used for non-critical safety applications and for infotainment
=> relaxed requirements
- sub-IPv6 C2C Network Layer provides ad-hoc routing with geographical broadcast domain
=> IPv6 is not aware of multi-hop network (single link from IPv6 perspective)
=> RO design is not directly affected and requirements are more general



Summary of Changes from -00

- Requirements restricted to the RO scope
- Removed requirements that are too specific to the C2C-CC technical approach
- Refined definition of requirements
- First cross-check with aviation industry requirements
(draft-eddy-nemo-aero-reqs-00)

RO Scenarios

- Reference: RO Solution Space Analysis (RFC 4889)
- non-nested NEMO RO case (RFC 4889, Section 3.1)
- RO between MR and Correspondent Entity. CE can be:
 1. a NEMO MR. E.g. vehicles or other mobile networks
 2. a NEMO RO-enabled router. E.g. newly deployed routers that serve dedicated CN.
 3. a NEMO RO-enabled CN. E.g. RSUs installed along the road.
 4. a MIPv6 RO-enabled CN
- Case 4 might blow up solution complexity => it was assigned a lower priority as compared with 1,2,3

Req 1 - Separability

“A RO technique, including its establishment procedure, MUST have the ability to be bypassed by applications that desire to use bidirectional tunnels through the HA.”

- In other words, RO can be triggered and does not start automatically for every data traffic
- **Motivation:**
 - in some cases, it might not be beneficial to activate RO (delay due to setup procedure, privacy, security ...)
- **Considerations:**
 - design or implementation issue?
 - also required by aviation industry

Req 2 - MNN IPsec

To be removed
because evident?

“A RO technique SHOULD allow MNNs connected to the MR to use IPsec as if they were connected to a regular access router.”

- In other words, nodes of the mobile networks should be able to use full IPsec functionalities
- **Motivation:**
 - no pre-existing relationship between MR (vehicle's embedded router) and MNN (passenger devices)
- **Considerations:**
 - IPsec support is understood, as it is part of IPv6 requirements
=> will be probably removed

Req 3 - RO Security

“A RO technique MUST prevent malicious nodes to claim false MNP ownership.”

[“ In order to achieve this, a RO technique MAY make use of security features provided by the sub-IPv6 C2C-CC Network layer (e.g. cryptographic protection), but it MUST NOT introduce new security leaks for the C2C-CC applications or render their security measures ineffective.”]

- In other words, a procedure like MIPv6 Return Routability is requested. Optionally, it can make use of specific security provided by the C2C stack.
- **Motivation:**
 - threats analysis that led to MIPv6 RR (RFC 4225)
- **Considerations:**
 - compatibility with legacy MIPv6 RR is not required by C2C-CC

Req 4 - Privacy Protection

“A RO technique MUST not require that the MNP is revealed to all nodes in the visited network.”

“ Instead, a RO technique MUST allow for revealing the MNP only to selected nodes in the visited network.”

“ Furthermore, a RO technique SHOULD allow that MNP and HoA are not exchanged as clear text.”

- In other words, C2C-CC is concerned about privacy in the ad-hoc domain and is designing mechanisms to prevent traceability of vehicles. Location privacy is also a concern.
- **Motivation:**
 - tracking of vehicles in ad-hoc domain to be minimized
 - tracking of vehicles from the Internet to be minimized
- **Considerations:**
 - users will be aware that by using the Internet their privacy is potentially decreased
 - nevertheless, RO with privacy protection is highly desirable

Req 5 - Multihoming

“A RO technique MUST allow a MR to be simultaneously connected to multiple access networks, having multiple prefixes and Care-Of Addresses in a MONAMI6 context.”

- In other words, NEMO RO should be usable for every CoA registered with the HA.
- **Motivation:**
 - vehicles to be equipped with multiple interfaces (802.11a/b/g, 802.11p, 3G, ...)
- **Considerations:**
 - RO scheme is not necessarily aware of the presence of multiple interfaces
 - also required by aviation industry

Req 6 - Coexistence with Sub-IPv6 RO

“A RO technique MUST allow for coexistence in the same OBU with a RO technique offered by the sub-IPv6 C2C-CC Network layer. The OBU MUST be able to choose which technique to use when both are simultaneously available.”

- In other words, C2C-CC stack to provide functions that inject IPv6 routes in the routing table. NEMO RO should coexist with that.
- **Motivation:**
 - C2C-CC specific deployment of NEMO
- **Considerations:**
 - this requirement should not be any difficult to achieve

Conclusions and next steps

- A solution for MR-CE non-nested RO is required by the C2C-C Consortium
- Requirements have been clarified but some refining is still needed
 - To be added: Delay for RO establishment
 - To be removed: IPsec (understood)
 - Improvements in terminology/citations
- Similarities with aviation requirements seem to allow for design of multipurpose solutions (but it's too early to state that)