64 Bit to 48 Bit MAC Bridging PAR and CSD

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PAR (1)

- **2.1 Title:** IEEE Standard for Local and metropolitan area networks--Bridges and Bridged Networks Amendment: 64 bit to 48 bit MAC Bridging

PAR (2)

- **5.2.b. Scope of the project:** This amendment will specify protocol extensions and managed objects to enable bridging between stations and networks using 64-bit MAC addresses, such as IEEE Std. 802.15.4 and between such 64-bit stations and networks and 48 –bit MAC address stations including IEEE 802.11ah. The protocol extensions will adapt MAC address and frame differences.
- **5.3 Is the completion of this standard dependent upon the completion of another standard**: No

PAR (3)

- **5.5 Need for the Project:** There is substantial on-going deployment of IEEE Std. 802.15.4, IEEE Std. 1394, and other 64-bit MAC stations.This amendment is needed
  - to facilitate intercommunication between 64-bit IEEE 802 stations and networks, such as IEEE Std 802.15.4, and the monitoring of 64-bit MAC traffic;
  - to provide intercommunication between 64-bit IEEE 802 stations and networks and 48-bit IEEE 802 stations and networks including IEEE Std 802.11ah;
  - to avoid using IPv6 which would burn up a lot of the link capacity;
  - To enable the use of TSN
- **5.6 Stakeholders for the Standard:** Developers, providers, and users of networking equipment and services, including networking IC developers, switch and NIC vendors, service providers, and end users.

PAR (4)

- **Intellectual Property**
- **6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?:** No
- **6.1.b. Is the Sponsor aware of possible registration activity related to this project?:** No
- **7.1 Are there other standards or projects with a similar scope?:** No
- **7.2 Joint Development**

  Is it the intent to develop this document jointly with another organization?: No

Project process requirements

- ***Managed objects***
  - *Describe the plan for developing a definition of managed objects. The plan shall specify one of the following:*
    - *a) The definitions will be part of this project.*
    - *b) The definitions will be part of a different project and provide the plan for that project or anticipated future project.*
    - *c) The definitions will not be developed and explain why such definitions are not needed.*

a) Enhancement to managed objects for bridging 64 bit MACs with 48 bit MACs will be included.

Project process requirements

- ***Coexistence***
  - *A WG proposing a wireless project shall demonstrate coexistence through the preparation of a Coexistence Assurance (CA) document unless it is not applicable.*
    a) *Will the WG create a CA document as part of the WG balloting process as described in Clause 13?*

    (no)

    a) *If not, explain why the CA document is not applicable.*
- Coexistence assurance documents for 802.15.4g, 802.15.4e and 802.11ah apply.

5C requirements

- ***Broad market potential***
  - *Each proposed IEEE 802 LMSC standard shall have broad market potential. At a minimum, address the following areas:*
    - *a) Broad sets of applicability.*
    - *b) Multiple vendors and numerous users.*

a) There is broad market potential including the current and anticipated growth of the Internet of Things. According to the Zigbee Alliance, annual shipments for 802.15.4 low power wireless chip sets doubled in 2014 and is on track to increase by 550% by 2020. Industry is actively pursuing similar uses for 802.11ah, called “HaLow” in the Wi-Fi Alliance.

b) Multiple vendors and users will benefit from this extension.

5C requirements

- ***Compatibility***
  - *Each proposed IEEE 802 LMSC standard should be in conformance with IEEE Std 802, IEEE 802.1AC, and IEEE 802.1Q. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with IEEE 802.1 WG prior to submitting a PAR to the Sponsor.*
    - *a) Will the proposed standard comply with IEEE Std 802, IEEE Std 802.1AC and IEEE Std 802.1Q?*
    - *b) If the answer to a) is no, supply the response from the IEEE 802.1 WG.*
  - *The review and response is not required if the proposed standard is an amendment or revision to an existing standard for which it has been previously determined that compliance with the above IEEE 802 standards is not possible. In this case, the CSD statement shall state that this is the case.*

a) Yes.

5C requirements

- ***Distinct Identity***
  - *Each proposed IEEE 802 LMSC standard shall provide evidence of a distinct identity. Identify standards and standards projects with similar scopes and for each one describe why the proposed project is substantially different.*
- There is no other 802 standard or approved project that provides the same functionality for end stations or bridges.

5C requirements

- ***Technical Feasibility***
  - *Each proposed IEEE 802 LMSC standard shall provide evidence that the project is technically feasible within the time frame of the project. At a minimum, address the following items to demonstrate technical feasibility:*
    - *a) Demonstrated system feasibility.*
    - *b) Proven similar technology via testing, modeling, simulation, etc.*

a) The 802.1Q MAC bridging is technically feasible and widely used. 64-bit to 48-bit MAC bridging can be built around similar principles and protocols and therefore is technically feasible. There is a new standard 802.1c for dynamic local MAC address allocation. The use of this standard within this new PAR is a way to temporarily assign 48 bit addresses that can be associated with each 64 bit address for translation. To avoid the problem of packet size mismatch a mechanism to negotiate MTU has to be specified in the standard or an ability to send fragmented packets over the 802.15.4 network needs to be added to the standard.

b) Mechanisms similar to what is being proposed exist in IEEE 802.1Q and its extensions, EUI-48, EUI-64 and use of EUI guidelines and have been shown to be reasonably testable.

5C requirements

- ***Economic Feasibility***
  - *Each proposed IEEE 802 LMSC standard shall provide evidence of economic feasibility. Demonstrate, as far as can reasonably be estimated, the economic feasibility of the proposed project for its intended applications. Among the areas that may be addressed in the cost for performance analysis are the following:*
    - *a) Balanced costs (infrastructure versus attached stations).*
    - *b) Known cost factors.*
    - *c) Consideration of installation costs.*
    - *d) Consideration of operational costs (e.g., energy consumption).*
    - *e) Other areas, as appropriate.*

a) 64-bit Ethernet ports are inexpensive because they are produced in volume for IEEE Std. 1394 and Infiniband hardware.

b) The proposed amendment will have no significant impact on the cost of bridges or end stations as no unusual or extraordinary processing is expected to be required

c) The cost factors are well known from implementations of IEEE 802.1Q. The proposed amendment is not expected to increase it substantially

d) There are no incremental installation costs relative to the existing costs associated with IEEE 802.1Q

e) There should be no significant impact on the cost of operation. it may reduce the operational cost by not requiring a Layer 3 solution.

f) No other areas have been identified.