OMEC Development and Deployment

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Sprint

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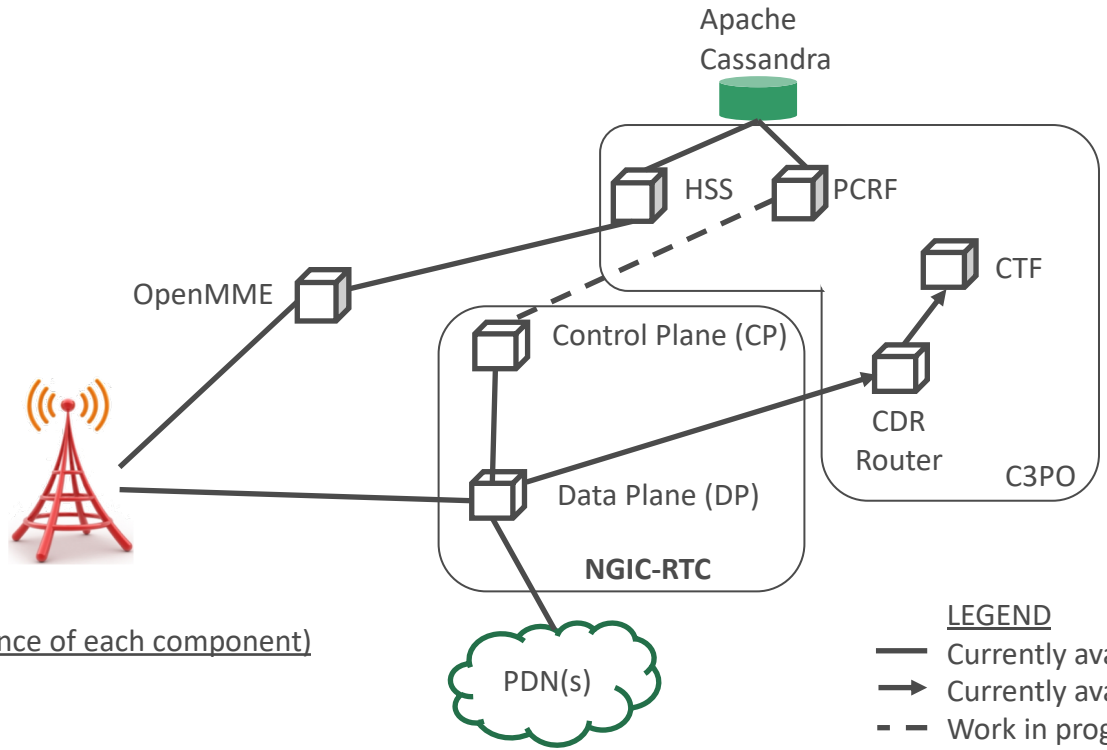
- OMEC Repositories
- Deployment Use Case – Edge Gateway
- Development of the Edge Gateway

OMEC Network Function Repositories



Single Frame (1 instance of each component)
40K Users
1K Control Plane TPS
42-80 CPU Cores

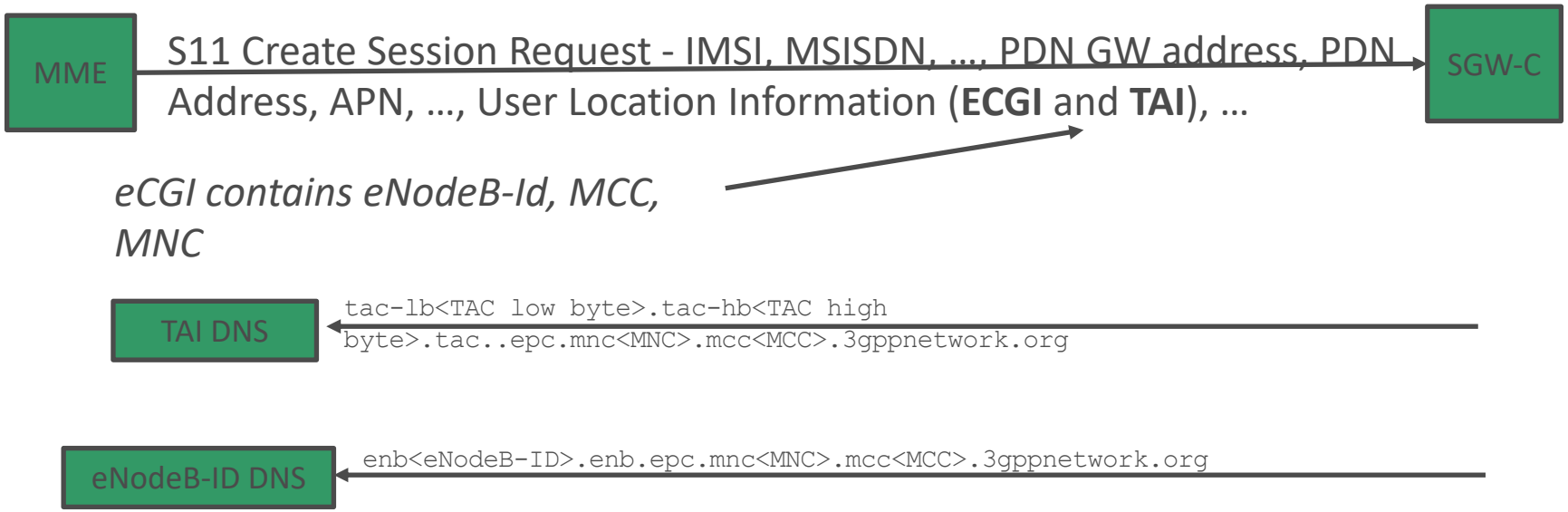
LEGEND
- Currently available
- Currently available (& unidirectional)
- Work in progress

Deployment Use Case – Edge Gateway

Edge Gateway Use Case

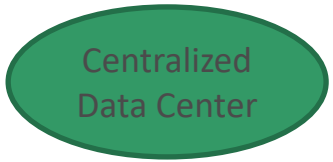
- Description – Provide an EPC based SAEGW that select the closest data termination (Edge Site) for a user
- Constraints
  - Minimal impact to existing production systems
    - No upgrades to eNodeBs
    - No changes to Tracking Area configurations
  - Support dynamic and operator assigned edges
- Accomplished with
  - TAI DNS server
  - eNodeB-ID DNS server
  - topon – Colocation determination – standard process in 3GPP
- Solution maintains 3GPP compliance while supporting all scenarios

SGW-C DNS Queries



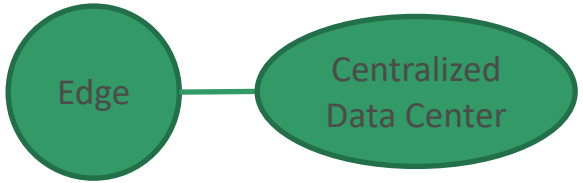
The SGW will resolve the responses to an IP Address

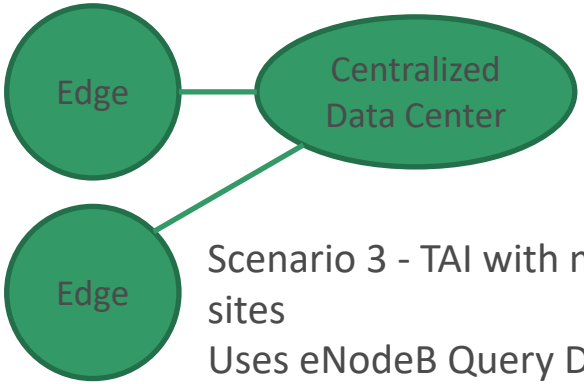
Scenarios



Scenario 1 - TAI with no Edge sites
Uses TAC Query Data (Business as usual)

Scenario 2 - TAI with single Edge site
Uses TAC Query Data





Scenario 3 - TAI with multiple Edge sites
Uses eNodeB Query Data

Simple logic: SGW-C queries both eNodeB and TAC.

If no eNodeB query answer is the response, TAC Query data is used.
Scenarios 2 & 3 have a “fallback” to the Centralized Data Center.

SGW Query – More Detail

At the SAEGW-C

1. Receive S11 CSR with ULI including eNodeB-ID and APN.
2. Determine role of the gateway (SGW, SAEGW or PGW) for APN. (This determines the UPF interfaces we are looking for – Sxa and Sxb or merely Sxa)
3. Following TS 29.244 (Sx spec) for UPF Sx selection by *both* eNodeBID and TAI (this includes topological colocation if indicated per TS 29.303).
    1. eNodeB query goes to App DNS*.
    2. TAI query goes to existing iDNS*.
4. If no eNodeBID record is returned, keep this fact in memory. Otherwise use the eNodeB query data.
5. Select the UPF via the iDNS TAI data and keep processing.

* - This assumes that the DNS cache does not already have a valid query present.

Development to Support the Use Case

Current Development

- Focus is on NGIC-RTC and supporting repositories
- Deployment-VMs (our production systems use OpenStack and VMs) but use of Container is not a major concern
- New pattern and Construction Techniques development used

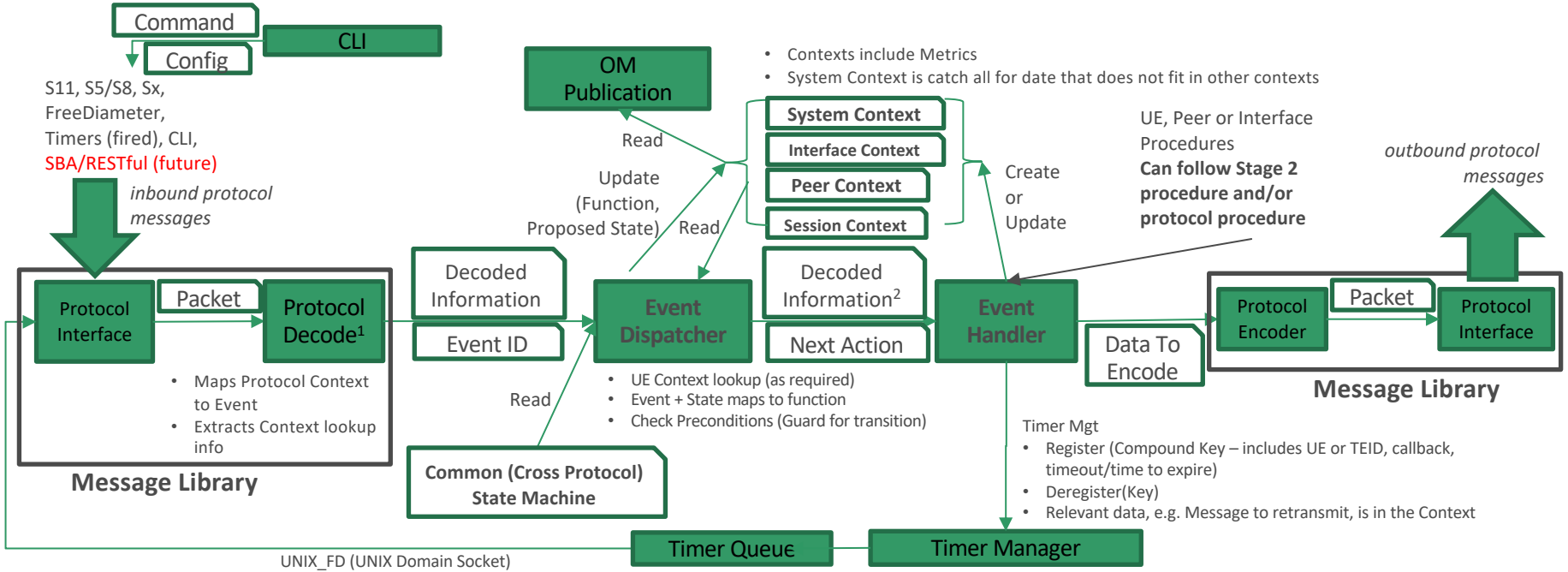
Function

- GTP-C
- PFCP
- Diameter
- All Stage 2 (TS 23.401) S11 GTP with GTP mobility procedures can be supported
- OAM
- Restoration and Recovery (TS 23.007)

Construction Techniques

- Stack Pattern
- Auto-generated protocol structures from the specifications directly
- State Machine Pattern
- OAM Patterns

Architecture Pattern – Control Plane



LEGEND

Activity

Information

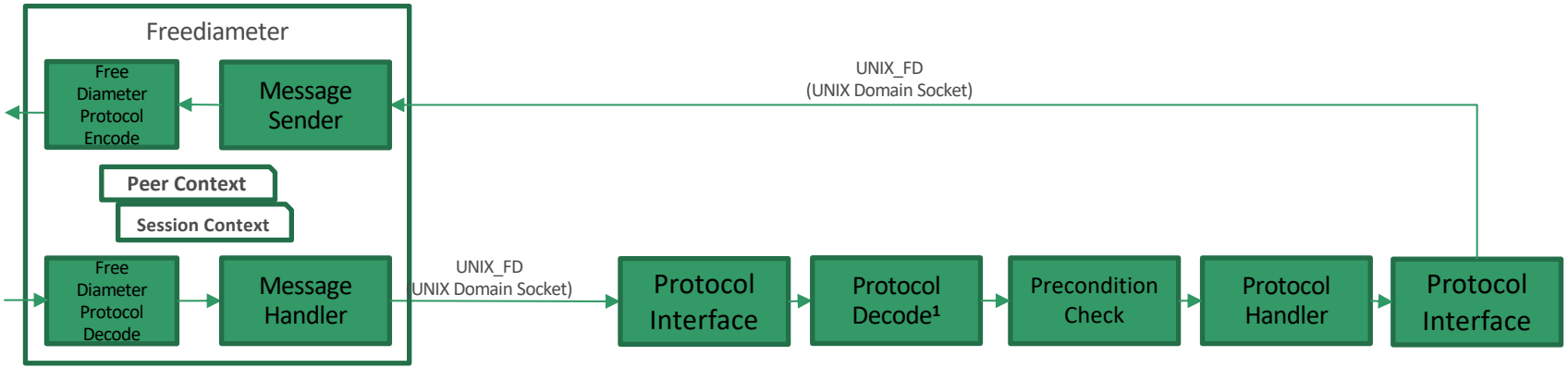
Text in BOLD – Code Stubs that must be customized

NOTES

1 – Decode does NOT occur for FreeDiameter or fired Timers

2 - May not always be present, e.g. retransmission

Architecture Pattern – Existing Stack Reuse



Note: Decode is skipped in CP since FreeDiameter has already decoded

Considerations: Would Multiple Diameter Applications ever result in multiple UNIX_FD socket in each direction?

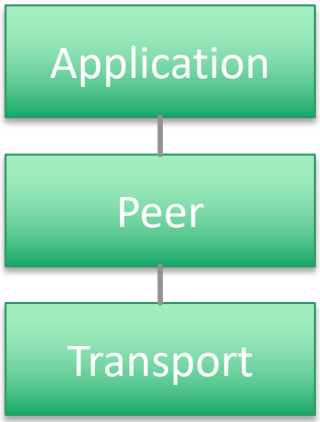
1 – Message is not decoded but the Event is assigned

Cross Message (Request / Answer) checking can take place

Stack Layer - Pattern

Services	*GTP-C Layer*
Reliability of Message Delivery	Peer / Application
Endpoint Path Failure Detection	Peer
Piggyback messages	Peer / Application
Protocol Errors	Peer
Unsupported Versions	Peer
Message Invalid Length	Peer / Application
Unknown Message	Peer
Unexpected Message	Application
Missing Information Element	Application
Invalid Length Information Element	Peer / Application
Semantically Incorrect Information Element	Application
Unknown or Unexpected Information Element	Application
Repeated Information Elements	Application
Common Structure Error Handling[1]	Application
Detection of Peer Reset	Peer (standard) / Application (possible)

Layers



1 - Protocol specific

Summary

Purpose - Provide an EPC based SAEGW that selects the closest data termination (Edge Site) for a user in NGIC-RTC

Approach - We're working with design patterns and a common approach

Focus

- Edge Gateway Use case and impacted component
- Compliance to specifications
- Improving the way we develop and test the code for quick, efficient repeatability

Timeline - Code delivery this year but acceptance of delivery, testing and verification and readiness to release to OMEC will take time

How to Engage with Community

- On Github - https://github.com/omec-project

- Weekly Meetings - POC
  - TST - Oguz Sunay oguz@opennetworking.org
  - Architecture|Design|Engineering - Pingping Lin pingping@opennetworking.org

Thank You

Follow Up Links:
https://github.com/omec-project