Private Public Partnership Project (PPP)
Large-scale Integrated Project (IP)

D.14 .7.3: FIWARE Technical Roadmap(IoT) Chapter)

Executive Summary

This document describes the roadmap of the features that FIWARE IoT chapter will deliver in the future, giving a detailed account of the schedule for the minor releases of Release 5.

A clear table shows the releases & sprints mapping them to calendar dates in the whole history of the platform until the end of Release 5 (September 2016). This technical chapter provides its internal roadmap for Release 5 in relation with this table.

The present document is a periodic issue that contains a snapshot of the state of the roadmap of the IoT chapter. The agile methodology implies a constant evolution of the roadmap and FIWARE strives to keep it up to date, accurately showing the results that will deliver in coming releases.

1.1　About This Document

Internet of Things chapter provides the Generic Enablers to allow Things to become available, searchable, accessible, and usable context resources fostering FIWARE-based Apps interaction with real-life objects.

In this context, Things mean any physical object, living organism, person or concept interesting from the perspective of an application and whose parameters are totally or partially tied to sensors, actuators or combinations of them.

1.2　Intended Audience

The document targets those interested in the intended direction of FIWARE's IoT Chapter.

1.3　Structure of this Document

The document is generated out of a set of documents provided in the public FIWARE wiki. For the current version of the documents, please visit the public wiki at http://wiki.fiware.org/

The following resources were used to generate this document:

> FIWARE_Techical_Roadmap
> Releases and Sprints numbering, with mapping to calendar dates
> Roadmap_of_Internet_of_Things_(IoT)_Services
> /Materializing_Internet_of_Things_(IoT)_Services_Enablement_in_FIWARE#Backend_Device_Management_GE
> Materializing_Internet_of_Things_(IoT)_Services_Enablement_in_FIWARE#Backend_IoT_Broker_GE
> Backend
> Materializing_Internet_of_Things_(IoT)_Services_Enablement_in_FIWARE#Gateway_Data_Handling_GE

The present document has been created from the wiki using automated tools and part of the links may not work. You may occasionally find oddities in the text format that side effects of the process but they do not deter the quality of the technical contents.

1.4 Keyword list

FIWARE, FI-Core, Acceleration Programme, Accelerators, PPP, Architecture Board, Steering Board, Roadmap, Reference Architecture, Generic Enabler, Open Specifications, I2ND, Cloud, IoT, Data/Media and Context Management, Applications/Services and Data Delivery, Delivery Framework , Security, Advanced Middleware, Interfaces to Networks and Robotics, Communities, Tools , Sustainability Support Tools, ICT, es.Internet, Apiary, Github, Latin American Platform.

1.5 Changes History

Release	Major changes description	Date	Editor
v1		2016-01-18	Gilles Privat
v2		2016-12-28	Gilles Privat

1.6 Table of Contents

2 Releases and Sprints numbering, with mapping to calendar dates

The list of Releases and Sprints together with the time frame of each one of them is depicted in the following table.

Versions	Oct 2014	Nov 2014	Dec 2014	Jan 2015	Feb 2015	Mar 2015	Apr 2015	May 2015	Jun 2015	Jul 2015	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016	Sep 2016
FIWARE(Closed) Month Number	M42	M43	M44																					
FIWARE Continuation (ongoing) Month Number	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25
First Major Release																								
Second Major Release																								
Third Major Release																								
Fourth Major Release	4.1.1	4.1.2	4.1.3	4.2.1	4.2.2	4.2.3	4.3.1	4.3.2	4.3.3	4.4.1	4.4.2	4.4.3												
Fifth Major Release													5.1.1	5.1.2	5.1.3	5.2.1	5.2.2	5.2.3	5.3.1	5.3.2	5.3.3	5.4.1	5.4.2	5.4.3

PLEASE NOTE that software associated to Minor Releases may be made available on the FIWARE Testbed and FIWARE Lab after completing that Minor Release, typically by the end of the following month. A revised version of the documentation accompanying software delivered after closing a Minor Release is also typically delivered by end of the following month.

Updates of all FIWARE GEs on the FIWARE Testbed will be planned after each Major Release completion. Besides, updates of the FIWARE Testbed may be decided on a more frequent basis at FIWARE GE level, i.e., the following month after completion of some Sprint.

As explained in [FIWARE Agile Development Methodology](#), the Releases and Sprints are referred to as

- FIWARE.Release.x.y

- FIWARE.Sprint.x.y.z

IMPORTANT NOTE FOR FIWARE DEVELOPMENT TEAMS : Make sure that you adhere to this convention when you fill in the fields "FIWARE Release id" and "FIWARE Sprint Id" in the backlog trackers.
"

3 Roadmap of Internet of Things (IoT) Services

3.1 Introduction

The Internet of Things Service Enablement chapter in FIWARE provides key assets enabling access to IoT resources.
You can learn more about the IoT Chapter by reading the [FIWARE Architecture and Open Specifications](#) .
Following is a description of the Technical Roadmap planned for the chapter, which will be developed through subsequent Releases of the FIWARE Platform. Please also check the [Releases and Sprints numbering, with mapping to calendar dates](#) .

3.2 Fifth Major Release

Following is a description of features per Generic Enablers that will be supported in Release 5 of FIWARE, both in the backend and gateway parts.

3.2.1.1 *Backend*

- Backend Device Management
    - Addition of new IoT protocols by means of new dedicated IoT Agents. Examples: OneM2M (inlcuding MCA northbound interface) & Modbus.
    - Development of IoT Agents at the Gateway level. Mainly to replace the previous "Protocol Adpater GE".
    - Deliver new SDKs for different hardware platforms: Arduino, Cludino, Intel Edision, ThinkingThings Open, RaspberryPI, etc.
    - Enable new features such as Device Management, IoT infrastructure management (using NGSI entities), etc.

- Backend IoT Broker
    - intelligent update request handling
    - efficient and energy saving IoT subsystem invocation
    - Enhance interface capabilities
    - harmonize additional interface features towards NGSI v2 support

- Backend IoT Discovery
    - Support geo-location discovery of entities
    - evolve (semantic) linked-data platform API to 2nd version
    - evolve NGSI API to 2nd version
    - provide ontology for IoT entities
    - provide a dataset generator for initial testing
    - change store from object database to document store

FIWARE GE	Supported Features	Epics under analysis
Backend Device Management	Release 5.1: • FIWARE.Feature.IoT.IDAS.Modularity.HomogeneousCommands • FIWARE.Feature.IoT.IDAS.Modularity.DevicesTimezone • FIWARE.Feature.IoT.IDAS.Modularity.DeviceLifeCicle • FIWARE.Feature.IoT.IDAS.Modularity.DeleteFunctions Release 5.2: • FIWARE.Feature.IoT.IDAS.Protocols.OneM2MBasic • FIWARE.Feature.IoT.IDAS.DevKit.SDKIntelEdison • FIWARE.Feature.IoT.IDAS.DevKit.SDKArduino Release 5.3: • FIWARE.Feature.IoT.IDAS.Protocols.nodejsMigration • FIWARE.Feature.IoT.IDAS.Modularity.NewGithubOrganization • FIWARE.Feature.IoT.IDAS.Modularity.ImproveOperations Release 5.4: • FIWARE.Feature.IoT.IDAS.Modularity.IoTManagerAdvanced • FIWARE.Feature.IoT.IDAS.EdgeManagement.IoTInfrastructure	• FIWARE.Epic.IoT.IDAS.Modularity • FIWARE.Epic.IoT.IDAS.Protocols • FIWARE.Epic.IoT.IDAS.DevKit • FIWARE.Epic.IoT.IDAS.GeoDescription • FIWARE.Epic.IoT.IDAS.EdgeManagement

	• FIWARE.Feature.IoT.IDAS.Protocols.Update	
Backend IoT Broker	Release 5.1 • FIWARE.Feature.IoT.BackendIoTBroker.SmartUpdateHandler Release 5.2 • FIWARE.Feature.IoT.BackendIoTBroker.HistoryQueries • FIWARE.Feature.IoT.BackendIoTBroker.AdvancedQueries Release 5.3 • FIWARE.Feature.IoT.BackendIoTBroker.WorkloadDistribution • FIWARE.Feature.IoT.BackendIoTBroker.SemanticsAwareness Release 5.4 • FIWARE.Feature.IoT.BackendIoTBroker.InterfaceNGSIv2	
IoT Discovery	Release 5.1: • FIWARE.Feature.IoT.IoTDiscovery.Repository.DatasetGenerator Release 5.2: • FIWARE.Feature.IoT.IoTDiscovery.Interface.SemanticRegApiV2 Release 5.3: • FIWARE.Feature.IoT.IoTDiscovery.Repository.Ngsi9GeoLocation	• FIWARE.Epic.IoT.IoTDiscovery.Interface • FIWARE.Epic.IoT.IoTDiscovery.Interoperability • FIWARE.Epic.IoT.IoTDiscovery.Repository

• FIWARE.Feature.IoT.IoTDiscovery.Interface.Ngsi9WebUI Release 5.4: • FIWARE.Feature.IoT.IoTDiscovery.Repository.Ngsi9OnDocumentStore • FIWARE.Feature.IoT.IoTDiscovery.Interface.NgsiV2	

3.2.1.2 *Gateway*

- IoT Data Edge Consolidation

The main effort in release 5 is to be compliant NGSI V2 and to improve the robustness of the broker and the CEP.

-
  o the CEP will offer geofencing operations.
  o the broker will be compliant ngsi9.
  o the broker and the CEP will interface with other GE with NGSI V2.

FIWARE GE	Supported Features	Epics under analysis
IoT Data Edge Consolidation	Release 5.1 • FIWARE.Feature.IoT.DataEdge-Cepheus.Broker.PersistentPubSub • FIWARE.Feature.IoT.IotDataEdgeConsolidation.CommonDataModel.NGSIV2GeolocTimestamp • FIWARE.Feature.IoT.DataEdge-Cepheus.Broker.RemoteBrokerFilter	• FIWARE.Epic.IoT.IotDataEdgeConsolidation.LocalStorage • FIWARE.Epic.IoT.DataEdge-Cepheus.Broker • FIWARE.Epic.IoT.IotDataEdgeConsolidation.CommonDataModel

• FIWARE.Feature.IoT.IotDataEdgeConsolidation.ComplexEventProcessing.ComplexType • FIWARE.Feature.IoT.DataEdge-Cepheus.CEP.MultiTenant • FIWARE.Feature.IoT.DataEdge-Cepheus.GUI.CepConfiguration Release 5.2 • FIWARE.Feature.IoT.DataEdge-Cepheus.NGSIv2.Basic • FIWARE.Feature.IoT.DataEdge-Cepheus.NGSIv1.REST • FIWARE.Feature.IoT.DataEdge-Cepheus.CEP.APIMonitoring	• FIWARE.Epic.IoT.DataEdge-Cepheus.CEP • FIWARE.Epic.IoT.IotDataEdgeConsolidation.Manager • FIWARE.Epic.IoT.DataEdge-Cepheus.NGSIv2 • FIWARE.Epic.IoT.DataEdge-Cepheus.NGSIv1 • FIWARE.Epic.IoT.DataEdge-Cepheus.NGSI9 • FIWARE.Epic.IoT.DataEdge-Cepheus.GUI

3.3   Future releases

The following features and epics correspond to features that are in the roadmap of the respective Generic Enablers, but are not going to be implemented as part of FIWARE project activities. Some of them may continue under the FIWARE Community activities, some others will not.

You can check out the previous releases of this FIWARE chapter on Roadmap of Internet of Things (IoT) Services(previous releases)

4 Materializing Internet of Things (IoT) Services Enablement in FIWARE

4.1 Introduction

Following is a description of the assets that have been adopted as baseline for building a reference implementations of the GEs in the Internet of Things (IoT) Services Enablement chapter of FIWARE. The reference implementation of a Generic Enabler is typically based on the evolution and integration of a number of assets, some being open source, therefore publicly available, while others being provided by partners of the FI-WARE project. A Backlog of Epics, Features and User-Stories followed for the evolution and integration of assets linked to the reference implementation of a Generic Enabler is also included. Finally, a list of topics still being addressed at a high level follows the description of assets in this chapter. They are mapped into Epics in the Chapter Backlog. Features and User-Stories, derived from refined of these Epics will be allocated to Backlogs linked to GEs in the future.

For a comprehensive vision on the IoT Services Enablement chapter architecture, you can go here . We highly recommend you to read it before analyzing how reference implementations of GEs are being materialized.

The Roadmap of the Internet of Things (IoT) Services Enablement chapter presents a description of the Technical Roadmap planned for the chapter, which will be developed through subsequent Releases of the FIWARE Platform. Please also check the Releases and Sprints numbering, with mapping to calendar dates .

4.2 Backend GEs

There are three IoT Backend Generic Enablers: "Backend Device Management GE", "Backend IoT Broker" and "Backend Configuration Manager". However, for traceability reasons the previous "Backend Things Management GE" has been included at the end. This GE was split in the two last listed above.

4.2.1 Backend Device Management GE

4.2.1.1 *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Backend Device Management Generic Enabler:
Telefonica IDAS4.x implements the Backend Device Management GE providing the following IoT Agents:

- http://github.com/telefonicaid/fiware-IoTAgent-Cplusplus/ : supports UL2.0/HTTP, MQTT or both (depends on the RPMs you decide to installal fater compilation)
- http://github.com/telefonicaid/lightweightm2m-iotagent : supports LWM2M/CoAP.

Additionally, the following SDKs and tools are provided to connect client physical or virtual devices:

- FIGWAY : It can be used to connect or simulate UL2.0/HTTP devices (sensors or actuators). It is basically a collection of Python2.7 scriipts to access the UL2.0/HTTP Iot Agent and the ContextBroker. It runs on RaspberryPI (Raspbian OS), MACOS, Linux and windows machines. Typical use: simulate virtual devices from your laptop/desktop computer or connect sensors and actuators connected somehow to a RaspberryPI or any gateway able to run python2.7

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.2.1.2   *Epics*

- FIWARE.Epic.IoT.BackendDeviceManagement.M2MAppServices
- FIWARE.Epic.IoT.BackendDeviceManagement.M2MNGSINotification
- FIWARE.Epic.IoT.BackendDeviceManagement.M2MDeviceCommunication
- FIWARE.Epic.IoT.BackendDeviceManagement.RPIGWAccess
- FIWARE.Epic.IoT.BackendDeviceManagement.FIWAREGWAccess
- FIWARE.Epic.IoT.IDAS.Modularity
- FIWARE.Epic.IoT.IDAS.Protocols
- FIWARE.Epic.IoT.IDAS.DevKit

4.2.1.3   *Features*

- FIWARE.Feature.IoT.BackendDeviceManagement.M2MAppServices.ServiceCreate
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MAppServices.DeviceSubscription
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MAppServices.DeviceCommand
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MAppServices.Query
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.NGSI9
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.NGSI10
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.SensorML-Register
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.SensorML-Observation
- FIWARE.Feature.IoT.BackendDeviceManagement.RPIGWAccess.SMLRPI
- FIWARE.Feature.IoT.BackendDeviceManagement.RPIGWAccess.NGSIRPI
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.NGSISetup
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.USNConfigurator
- FIWARE.Feature.IoT.BackendDeviceManagement.FIWAREGWAccess.GWDevMan
- FIWARE.Feature.IoT.BackendDeviceManagement.FIWAREGWAccess.DataHandling
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.ETSIM2M

- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.NGSIDevices
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MDeviceCommunication.6LowPAN-CoAP
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.Commands
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.NGSIEvolution
- FIWARE.Feature.IoT.BackendDeviceManagement.M2MNGSINotification.IotAgentConfig
- FIWARE.Feature.IoT.IDAS.Modularity.Agents
- FIWARE.Feature.IoT.IDAS.DevKit.UL20
- FIWARE.Feature.IoT.IDAS.Modularity.CommonNorthAPI
- FIWARE.Feature.IoT.IDAS.Protocols.LWM2MCoAP
- FIWARE.Feature.IoT.IDAS.DevKit.NodejsGenericAgent
- FIWARE.Feature.IoT.IDAS.DevKit.LWM2M-CoAP
- FIWARE.Feature.IoT.IDAS.Modularity.Commands
- FIWARE.Feature.IoT.IDAS.Protocols.MQTT
- FIWARE.Feature.IoT.IDAS.Protocols.UL20
- FIWARE.Feature.IoT.IDAS.DevKit.NGSI
- FIWARE.Feature.IoT.IDAS.Protocols.MQTTCommands
- FIWARE.Feature.IoT.IDAS.Protocols.LWM2MEvolution
- FIWARE.Feature.IoT.IDAS.Protocols.UL20Evolution

4.2.1.4 *Unit Testing Plan*

Please, note the following file refers to the previous versions of IDAS (3.x).
It is expected to be provided in the future for IDAS4.x.

- Backend_Device_Manager - IDAS - Unit Testing Plan

4.2.1.5 *Product Guides*

Please, note the following files refer to the previous versions of IDAS (3.x) and therefore are deprecated. In order to get updated manuals for the two IDAS IoT Agents, please refer to the documentation files in the Github repositories linked above in this page.

- Backend Device Manager - IDAS - User and Programmers Guide
- Backend Device Manager - IDAS - Installation and Administration Guide

4.2.2 Backend IoT Broker GE

4.2.2.1 *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Backend IoT Broker Generic Enabler:

- [ISIS](#) is an infrastructure for the collection, reasoning and distribution of real world information (Things and their Attributes) as well as Thing-level actuation.
- [IoT-A](#) is the 'Internet of Things Architecture' project to establish and to evolve a federating architectural reference model for the future IoT. For more details check " http://www.iot-a.eu "

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.2.2.2   *Epics*

- [FIWARE.Epic.IoT.BackendIoTBroker.Associations](#)
- [FIWARE.Epic.IoT.BackendIoTBroker.Query](#)
- [FIWARE.Epic.IoT.BackendIoTBroker.SubscribeNotify](#)
- [FIWARE.Epic.IoT.BackendIoTBroker.Update](#)

4.2.2.3   *Features*

- [FIWARE.Feature.IoT.BackendIoTBroker.Associations.Query](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Associations.Update](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Associations.SubscribeNotify](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.IdBased](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Update.IdBased](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.TypeBased](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Query.Patterns](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.Patterns](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Query.Restriction](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.Restriction](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.AttributeDomain](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Update.AttributeDomain](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Metadata.Timestamp](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Metadata.Provider](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Panel](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Query.Datacheck](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.SubscribeNotify.Datacheck](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.WebQueryInterface](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.SelfAuthentification](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Federation](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.JSON](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.DataStorage](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Standalone](#)

- [FIWARE.Feature.IoT.BackendIoTBroker.Device2Things](#)
- [FIWARE.Feature.IoT.BackendIoTBroker.Modularization](#)

4.2.2.4 *User-Stories*

4.2.2.5 *Unit Testing Plan*

- [Backend IoT Broker - IoT Broker - Unit Testing Plan](#)

4.2.2.6 *Product Guides*

- [Backend IoT Broker - IoT Broker - User and Programmers Guide](#)
- [Backend IoT Broker - IoT Broker - Installation and Administration Guide](#)

4.2.3 Backend IoT Discovery GE

4.2.3.1 *Baseline Assets*

IoT Discovery GEri

- [IoT-A](#) is the 'Internet of Things Architecture' project to establish and to evolve a federating architectural reference model for the future IoT. For more details check " [http://www.iot-a.eu](#) "
- [Linked Data Platform](#): the linked sensor data platform supports publication and access to resource and entity descriptions described by the semantic models. The semantic

descriptions, wherever applicable, are provided in association to concepts defined on the Linked Open Data cloud (e.g. location data, semantic tags, etc.).

4.2.3.2 *Epics*

IoT Discovery GEri

- FIWARE.Epic.IoT.IoTDiscovery.IoTDescriptionMgmt
- FIWARE.Epic.IoT.IoTDiscovery.ProbabilisticSearch
- FIWARE.Epic.IoT.IoTDiscovery.SemanticSearch

- FIWARE.Epic.IoT.IoTDiscovery.Interface
- FIWARE.Epic.IoT.IoTDiscovery.Repository
- FIWARE.Epic.IoT.IoTDiscovery.Interoperability

4.2.3.3 *Features*

IoT Discovery GEri

- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.AdvDescription
- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.NGSI9
- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.NGSI9.ConvenienceOperations
- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.NGSI9.StandardOperations
- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.NGSI9.Associations
- FIWARE.Feature.IoT.IoTDiscovery.IoTDescriptionMgmt.WebUI
- FIWARE.Feature.IoT.IoTDiscovery.ProbabilisticSearch.Discover.TemplateBased
- FIWARE.Feature.IoT.IoTDiscovery.ProbabilisticSearch.EngineTraining
- FIWARE.Feature.IoT.IoTDiscovery.ProbabilisticSearch.Register.FoldingIn
- FIWARE.Feature.IoT.IoTDiscovery.SemanticSearch.AssociationMatching
- FIWARE.Feature.IoT.IoTDiscovery.SemanticSearch.Discover.Sparql
- FIWARE.Feature.IoT.IoTDiscovery.Interface.Ngsi9Json
- FIWARE.Feature.IoT.IoTDiscovery.Repository.Ngsi9ContextExpiration
- FIWARE.Feature.IoT.IoTDiscovery.Repository.EmbeddedSemanticStore
- FIWARE.Feature.IoT.IoTDiscovery.Interface.AdvDescExtension
- FIWARE.Feature.IoT.IoTDiscovery.Interoperability.SemanticAnnotator

- FIWARE.Feature.IoT.IoTDiscovery.Interface.CoAPSupport

4.2.3.4 *Unit Testing Plan*

- Backend IoT Discovery - IoT Discovery - Unit Testing Plan

4.2.3.5 *Product guides*

- [Backend IoT Discovery - IoT Discovery - Installation and Administration Guide](#)
- [Backend IoT Discovery - IoT Discovery - User and Programmers Guide](#)

4.2.4 Backend Template Handler GE

4.2.4.1 *Baseline Assets*

The main asset that has been adopted as baseline for the reference implementation of the Backend Template Handler Generic Enabler is:

- Activiti Engine (modeler and BPMN engine) [1] which is light weight and easy to use for Java developers.

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.2.4.2 *Epics*

- [FIWARE.Epic.IoT.BackendTemplateHandler.IoTProcessExecution.ExecutionModule](#)
- [FIWARE.Epic.IoT.BackendTemplateHandler.IoTProcessExecution.UnreliableDataHandling](#)
- [FIWARE.Epic.IoT.BackendTemplateHandler.ThingBasedProcesses](#)

4.2.4.3 *Features*

- [FIWARE.Feature.IoT.BackendTemplateHandler.IoTProcessExecution.UnreliableDataHandling.Execute](#)
- [FIWARE.Feature.IoT.BackendTemplateHandler.ThingBasedProcesses.HandleThingBasedProcess](#)
- [FIWARE.Feature.IoT.BackendTemplateHandler.IoTProcessExecution.ExecutionModule.NGSIInterface](#)

4.2.4.4 *Unit Testing Plan*

- [Template Handler - Template Handler - Unit Testing Plan](#)

4.2.4.5 *Product guides*

- [Template Handler - Template Handler - Installation and Administration Guide](#)
- [Template Handler - Template Handler - User and Programmers Guide](#)

4.2.5　　Backend Things Management GE

Note: This Generic Enabler is not further developed after FIWARE release 1. Its functionality is now implemented by the new IoT Broker GE and Configuration Management GE. These new GEs have been internal parts of the Things Management GE before.

4.2.5.1　*Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Backend Things Management Generic Enabler:

- IDAS is a IoT platform to automate the acquisition and management of the information retrieved from generic wireless sensor and actuator networks.
- ISIS is an infrastructure for the collection, reasoning and distribution of real world information (Things and their Attributes) as well as Thing-level actuation.
- IoT-A is the 'Internet of Things Architecture' project to establish and to evolve a federating architectural reference model for the future IoT. For more details check " http://www.iot-a.eu "
- SOL is a research program focusing on different problem domains in the area of the Internet of Things
- Sensei provides an architecture to discover and manage resources and entities of interest ("things") and interactions between them
- Linked Data Platform and Gateway : the linked sensor data platform supports publication and access to resource and entity descriptions described by the semantic models. The semantic descriptions, wherever applicable, are provided in association to concepts defined on the Linked Open Data cloud (e.g. location data, semantic tags, etc.).

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.2.5.2　*Themes*

4.2.5.3　*Epics*

- FIWARE.Epic.IoT.BackendThingsManagement.TypeBasedInteraction
- FIWARE.Epic.IoT.BackendThingsManagement.additionalScopes
- FIWARE.Epic.IoT.BackendThingsManagement.attributeDomains
- FIWARE.Epic.IoT.BackendThingsManagement.SemanticHandler
- FIWARE.Epic.IoT.BackendThingsManagement.AdvancedResourceDescription
- FIWARE.Epic.IoT.BackendThingsManagement.DiscoveryEngine
- FIWARE.Epic.IoT.BackendThingsManagement.UpdateOperation
- FIWARE.Epic.IoT.BackendThingsManagement.SubscribeNotify
- FIWARE.Epic.IoT.BackendThingsManagement.FullPatterns
- FIWARE.Epic.IoT.BackendThingsManagement.attributeExpressions
- FIWARE.Epic.IoT.BackendThingsManagement.notificationThrottling

- FIWARE.Epic.IoT.BackendThingsManagement.associations
- FIWARE.Epic.IoT.BackendThingsManagement.Actuation
- FIWARE.Epic.IoT.BackendThingsManagement.ThingsAndIoTServiceMonitoring
- FIWARE.Epic.IoT.BackendThingsManagement.ResourcesAndServicesDiscovery
- FIWARE.Epic.IoT.BackendThingsManagement.CatalogAndLocation

4.2.5.4 *Features*

- FIWARE.Feature.IoT.BackendThingsManagement.Registration.IdBased
- FIWARE.Feature.IoT.BackendThingsManagement.Registration.Update
- FIWARE.Feature.IoT.BackendThingsManagement.Discovery.IdBased
- FIWARE.Feature.IoT.BackendThingsManagement.Discovery.SimplePatternBased
- FIWARE.Feature.IoT.BackendThingsManagement.Query.IdBased
- FIWARE.Feature.IoT.BackendThingsManagement.Query.SimplePatternBased

- FIWARE.Feature.IoT.BackendThingsManagement.Registration.simpleGeoScopes
- FIWARE.Feature.IoT.BackendThingsManagement.Discovery.simpleGeoScopes
- FIWARE.Feature.IoT.BackendThingsManagement.Query.simpleGeoScopes
- FIWARE.Feature.IoT.BackendThingsManagement.Discovery.typeBased
- FIWARE.Feature.IoT.BackendThingsManagement.Query.typeBased
- FIWARE.Feature.IoT.BackendThingsManagement.Registration.attributeDomains
- FIWARE.Feature.IoT.BackendThingsManagement.Query.attributeDomain
- FIWARE.Feature.IoT.BackendThingsManagement.Registration.advancedDescriptions
- FIWARE.Feature.IoT.BackendThingsManagement.Discovery.advancedBased

4.2.5.5 *User-Stories*

This is a placeholder for user stories in further development phases.

4.2.5.6 *Unit Testing Plan*

Backend Things Management - Unit Testing Plan

4.2.5.7 *Product Guides*

- Backend Things Management - User and Programmers Guide

4.3   Gateway GEs

4.3.1   Gateway Device Management GE

4.3.1.1   *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Gateway Device Management Generic Enabler:

- FossTrak is an open source RFID software platform that implements the EPC Network specifications. It is intended to support application developers and integrators by providing core software components for track and trace applications. For more details check " http://www.fosstrak.org "
- M2MPlanet/Pangoo is a M2M research platform with user interface to deploy and monitor sensors and actuators networks, including gateways.
- Ericsson Gateway

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.3.1.2   *Epics*

- FIWARE.Epic.IoT.GatewayDeviceManagement.DeviceStatusMonitoring
- FIWARE.Epic.IoT.GatewayDeviceManagement.RemoteManagement
- FIWARE.Epic.IoT.GatewayDeviceManagement.DeviceCommunicationFailure
- FIWARE.Epic.IoT.GatewayDeviceManagement.DisconnectedDeviceManagement
- FIWARE.Epic.IoT.GatewayDeviceManagement.AddressCreation
- FIWARE.Epic.IoT.GatewayDeviceManagement.AddressTranslation
- FIWARE.Epic.IoT.GatewayDeviceManagement.ResourcesDirectory
- FIWARE.Epic.IoT.GatewayDeviceManagement.DirectoryHandler
- FIWARE.Epic.IoT.GatewayDeviceManagement.OpenMTC.AddressTranslation

4.3.1.3   *Features*

- FIWARE.Feature.IoT.GatewayDeviceManagement.NorthboundInterface.ETSIm2m
- FIWARE.Feature.IoT.GatewayDeviceManagement.BasicReachability
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceCapabilitiesList
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceInformationAccess
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceInformationSubscribe
- FIWARE.Feature.IoT.GatewayDeviceManagement.ResourcesDirectory.ResourceDirectory
- FIWARE.Feature.IoT.GatewayDeviceManagement.M2MNGSI.NGSI9

- FIWARE.Feature.IoT.GatewayDeviceManagement.M2MNGSI.NGSI10
- FIWARE.Feature.IoT.GatewayDeviceManagement.M2MNGSINotification.NGSI9
- FIWARE.Feature.IoT.GatewayDeviceManagement.M2MNGSINotification.NGSI10
- FIWARE.Feature.IoT.GatewayDeviceManagement.M2MNGSI.CommonDataModel
- FIWARE.Feature.IoT.GatewayDeviceManagement.OpenMTC.AddressTranslation
- FIWARE.Feature.IoT.GatewayDeviceManagement.NGSI_JSON
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceControl
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceReconfigure
- FIWARE.Feature.IoT.GatewayDeviceManagement.DeviceCapabilitiesDiscovery
- FIWARE.Feature.IoT.GatewayDeviceManagement.DisconnectedDeviceManagement.SimpleAutomatedReconnect

4.3.1.4 *Unit Testing Plan*

- Gateway Device Manager - OpenMTC - Unit Testing Plan

4.3.1.5 *Product Guides*

- Gateway Device Manager - OpenMTC - User and Programmers Guide
- Gateway Device Manager - OpenMTC - Installation and Administration Guide

4.3.2 Gateway Protocol Adapter GE

4.3.2.1 *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Gateway Protocol Adapter Generic Enabler:

- ZigBee Gateway Device software module, an implementation of the ZGD specification, provided as Open Source under the Apache 2 license and available from the project ZigBee4OSGi [2]
- Home Automation Gateway library, an implementation of appliances abstractions, provided under FRAND licence.
- Ericsson Gateway
- EPC GE

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.3.2.2 *Themes*

- FIWARE.Theme.IoT.GatewayProtocolAdapter

4.3.2.3 *Epics*

- FIWARE.Epic.IoT.GatewayProtocolAdapterZPA.Adapter
- FIWARE.Epic.IoT.GatewayProtocolAdapterZPA.AbstractionProtocolLayer
- FIWARE.Epic.IoT.GatewayProtocolAdapterZPA.CloudEdgeProtocolAdapter
- FIWARE.Epic.IoT.GatewayProtocolAdapterZPA.IoTDevicesMgntGui
- FIWARE.Epic.IoT.GatewayProtocolAdapterZPA.NorthboundNGSI

- FIWARE.Epic.IoT.GatewayProtocolAdapterEPC.NGSI
- FIWARE.Epic.IoT.GatewayProtocolAdapterEPC.TracingEPC

- FIWARE.Epic.IoT.GatewayProtocolAdapterMRCOAP.Adapter
- FIWARE.Epic.IoT.GatewayProtocolAdapterMRCOAP.NorthboundNGSI

4.3.2.4 *Features*

- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.BasicCommunication
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.ResponseMessagesGeneration
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.EventsGeneration
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.CommunicationsFunctions
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.ReadWriteOperations
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.CallbacksManagement
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.NodeAddressesDiscovery
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.EndpointConfiguration
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.ZigBee.APSMessage
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.Adapter.Codec
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.NativeProtocolAdapter.GenericDeviceAccess
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.CloudEdgeProtocolAdapter.Integration_CE_ZPA
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.IoTDevicesMgntGui.DisplayDeviceStatusConnection
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.IoTDevicesMgntGui.DisplayDeviceCapabilities
- FIWARE.Feature.IoT.GatewayProtocolAdapterZPA.NorthboundNGSI.EventProducer

- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.LocalEPCIS
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.ONS
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteDS1
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteDS2
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteEPCIS1
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteEPCIS2
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.AccessRulesDS1
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.AccessRulesDS2
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteIS2DS1

- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.RemoteIS2DS2
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.Resolver
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.TracingEPC.Query
- FIWARE.Feature.IoT.GatewayProtocolAdapterEPC.NGSI

- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.NorthboundNGSI.NGSIBasicConnection
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.NorthboundNGSI.NGSIContextRegistering
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.NorthboundNGSI.NGSIEventForwarding
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.Adapter.NodeAddressesDiscovery
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.Adapter.EventsGeneration
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.Adapter.ResponseMessagesGeneration
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.Adapter.CommunicationsFunctions
- FIWARE.Feature.IoT.GatewayProtocolAdapterMRCOAP.Adapter.BasicCommunication

4.3.2.5 *User-Stories*

4.3.2.6 *Unit Testing Plan*

- Gateway Protocol Adapter - Unit Testing Plan

4.3.2.7 *Product Guides*

- Gateway Protocol Adapter - Installation and Administration Guide
- Gateway Protocol Adapter - User and Programmers Guide

4.3.3 Gateway Data Handling GE

4.3.3.1 *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Gateway Data Handling Generic Enabler:

- M2MPlanet/Pangoo is a M2M research platform with user interface to deploy and monitor sensors and actuators networks, including gateways.
- SOL/CEP is a Complex Event Processor capable of handling large volumes of different types of events and correlating them into complex events by means of a funcional event specification language (Dolce).

- [Orange CEP Application Server](#) is an application server dedicated to complex event processing. It is typically used on top of middlewares or mediation layers, in order to propagate value-added and filtered data by aggregation or composition.

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.3.3.2   *Epics*

- [FIWARE.Epic.IoT.GatewayDataHandling.ComplexEventProcessing](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.CommonDataModel](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.LocalStorage](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.DataTransformation](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.ConfigurationBackup](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.Embedded](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.Manager](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.FleetManagement](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.Modularize](#)
- [FIWARE.Epic.IoT.GatewayDataHandling.Broker](#)

4.3.3.3   *Features*

- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.Admin](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.EventTypes](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.Rules](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.RealtimeData](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.Filtering](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.Aggregation](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ComplexEventProcessing.AutoRegistration](#)

- [FIWARE.Feature.IoT.GatewayDataHandling.CommonDataModel.NGSI](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.CommonDataModel.PubSub](#)

- [FIWARE.Feature.IoT.GatewayDataHandling.LocalStorage.BackupOutputCEP](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.LocalStorage.HistoricalData](#)

- [FIWARE.Feature.IoT.GatewayDataHandling.DataTransformation.Input](#)

- [FIWARE.Feature.IoT.GatewayDataHandling.ConfigurationBackup.Esper](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ConfigurationBackup.ApplicationWide](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.ConfigurationBackup.NGSI](#)

- [FIWARE.Feature.IoT.GatewayDataHandling.Embedded.CloudEdge](#)
- [FIWARE.Feature.IoT.GatewayDataHandling.Embedded.RaspberryPi](#)

- FIWARE.Feature.IoT.GatewayDataHandling.FleetManagement.CepRules
- FIWARE.Feature.IoT.GatewayDataHandling.FleetManagement.EventSinks
- FIWARE.Feature.IoT.GatewayDataHandling.FleetManagement.EventStorage
- FIWARE.Feature.IoT.GatewayDataHandling.FleetManagement.EventTypes
- FIWARE.Feature.IoT.GatewayDataHandling.FleetManagement.Ngsi

- FIWARE.Feature.IoT.GatewayDataHandling.Modularize.Persistence

4.3.3.4   *Unit Testing Plan*

Gateway Data Handling - Unit Testing Plan

4.3.3.5   *Product Guides*

- Gateway Data Handling - User and Programmers Guide
- Gateway Data Handling - Installation and Administration Guide

4.4   Other GEs

4.4.1   Topics still being addressed at high-level

4.4.1.1   *Epics*

- FIWARE.Epic.IoT.GatewaySecurityMonitoring
- FIWARE.Epic.IoT.LowPowerEncryption
- FIWARE.Epic.IoT.DevicesAndGatewaysAnonymization

4.4.2   Legacy Topics

4.4.2.1   *Themes*

- FIWARE.Theme.IoT.Semantic

4.4.2.2   *Epics*

- FIWARE.Epic.IoT.Semantic.IntelligentDecisionMaking

4.4.2.3   *Features*

- FIWARE.Feature.IoT.Semantic.SemanticMediator

- [FIWARE.Feature.IoT.Semantic.ContextCollector](#)
- [FIWARE.Feature.IoT.Semantic.ContextMediator](#)

4.4.2.4   *User-Stories*

- [FIWARE.Story.IoT.Semantic.SemanticMediator.OntologyDeployment](#)

4.4.2.5   *User-Stories*

- [FIWARE.Story.IoT.Gateway.DataHandling.DataFilteringAndAggregation.DeviceEmbeddedCep.CEPEngineManagement](#)
- [FIWARE.Story.IoT.Gateway.DataHandling.DataFilteringAndAggregation.DeviceEmbeddedCep.Statement](#)
- [FIWARE.Story.IoT.Gateway.DataHandling.DataFilteringAndAggregation.DeviceEmbeddedCep.EventType](#)
- [FIWARE.Story.IoT.Gateway.DataHandling.IoTPublish.Broker.CepToMessageBroker](#)

4.4.2.6   *Unit Testing Plan*

[Gateway Data Handling - Unit Testing Plan](#)

4.4.2.7   *Product Guides*

- [Gateway Data Handling - User and Programmers Guide](#)
- [Gateway Data Handling - Installation and Administration Guide](#)

4.4.3   Gateway Security GE

4.4.3.1   *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Gateway Security Generic Enabler:

- N/A

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.4.3.2   *Epics*

- [FIWARE.Epic.IoT.Gateway.Security.AccessPolicyControl](#)

4.4.3.3   *Features*

- FIWARE.Feature.IoT.Gateway.Security.AccessRights.Creation
- FIWARE.Feature.IoT.Gateway.Security.AccessRights.Deletion
- FIWARE.Feature.IoT.Gateway.Security.AccessRights.Validation

4.4.4   Gateway Advanced Connectivity GE

4.4.4.1   *Baseline Assets*

Following is the list of main assets that have been adopted as baseline for the reference implementation of the Devices Fronted Generic Enabler:

- N/A

Following is the compilation of entries in the Backlog followed for materialisation of this Generic Enabler.

4.4.4.2   *Themes*

- FIWARE.Theme.IoT.Gateway.AdvancedConnectivity

4.4.4.3   *Epics*

- FIWARE.Epic.IoT.Gateway.AdvancedConnectivity.MobilityManagement
- FIWARE.Epic.IoT.Gateway.AdvancedConnectivity.ConnectivityStatusManagement
- FIWARE.Epic.IoT.Gateway.AdvancedConnectivity.SessionManagement
- FIWARE.Epic.IoT.Gateway.AdvancedConnectivity.TrafficFlowManagement
- FIWARE.Epic.IoT.Gateway.AdvancedConnectivity.QualityOfServiceControl

4.4.4.4   *Features*

- FIWARE.Feature.IoT.Gateway.AdvancedConnectivity.SessionManagement.M2MDeviceSessionManagement
- FIWARE.Feature.IoT.Gateway.AdvancedConnectivity.SessionManagement.NativeDeviceSessionManagement