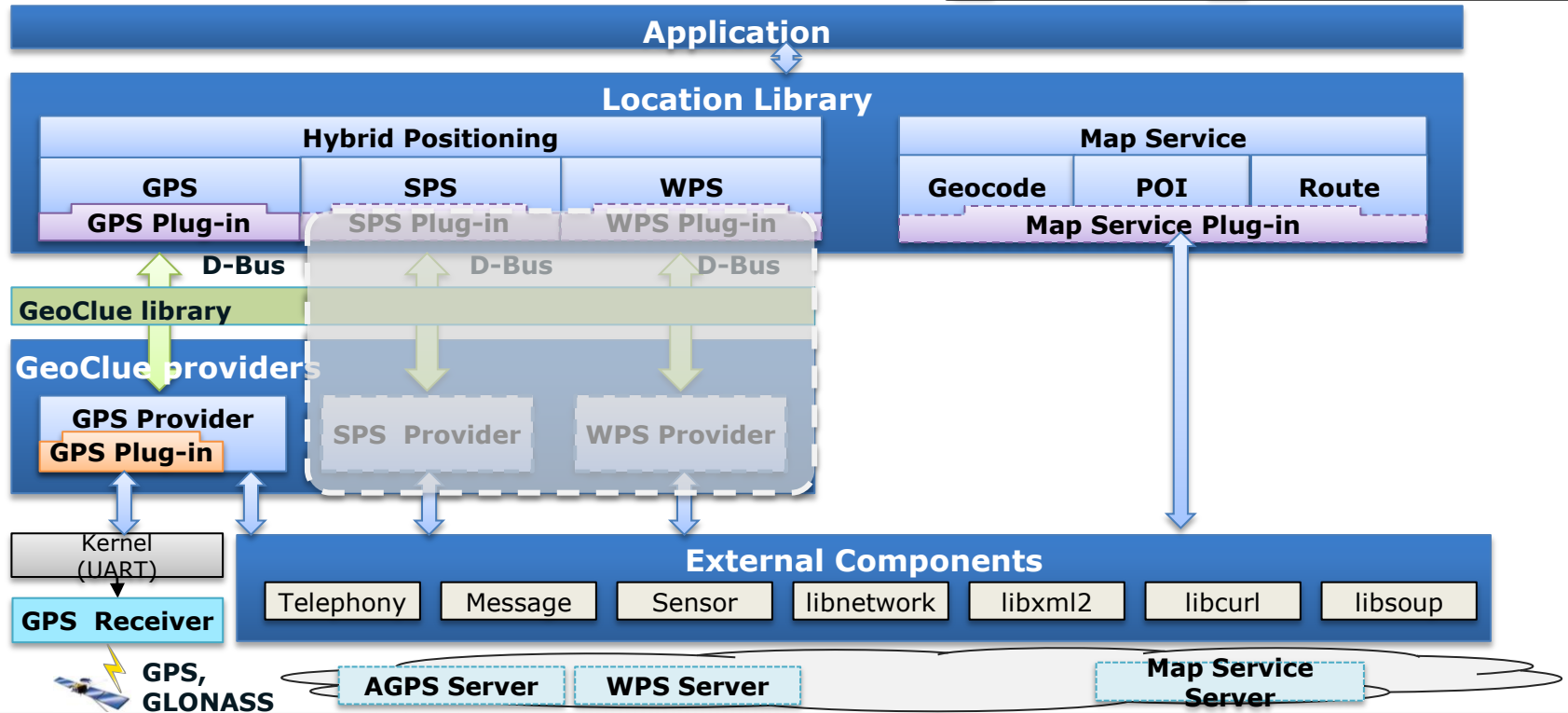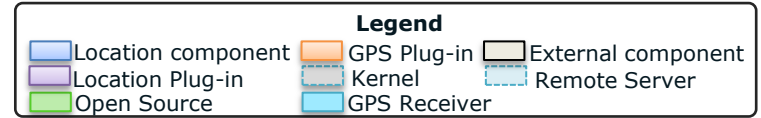# Contents

- Introduction
- Location Architecture
- Location Components
- Location Use Cases
- How to Interact between Components
- Positioning Technologies for Fast Position Fix
- Comparison of Positioning Technologies
- Summary

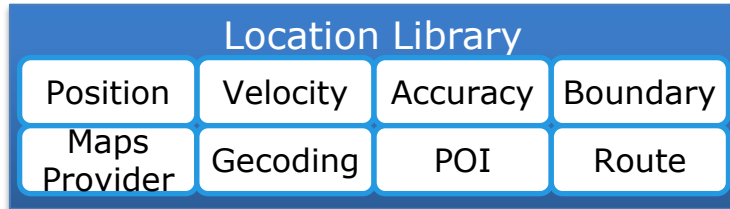**TIZEN**™ DEVELOPER CONFERENCE MAY 7–9, 2012

Introduction

- Location Framework provides location based services (LBS), including the position information, satellite information, and GPS status. It is based on GeoClue that delivers location information received from various positioning sources such as GPS, WPS, Cell ID, and sensors.

- Location Framework features
    - Hybrid positioning solution
        - GPS (Global Positioning System)
        - WPS (Wi-Fi Positioning System)
        - SPS (Sensor Positioning System)
    - Get the current position, last known position, distance, and velocity
    - Get satellite information of GPS and GLONASS
    - Geo-fencing : Notify when a user enters to or exits from a predefined set of boundaries like school attendance zone or neighborhood boundary
    - Geocoding and reverse geocoding
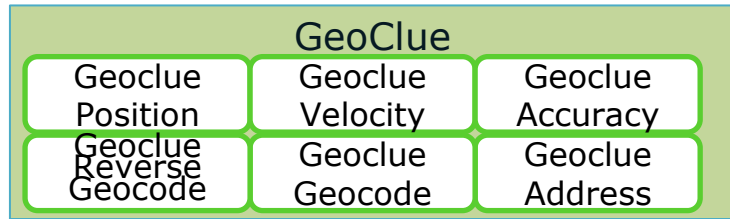   - Search POI(Point of interests)
    - Calculate route

tizen.org

TIZEN DEVELOPER CONFERENCE MAY 7–9, 2012

Location Architecture

Legend:
- Location component
- Location Plug-in
- Open Source
- GPS Plug-in
- Kernel
- GPS Receiver
- External component
- Remote Server

Application

Location Library

Hybrid Positioning

GPS	SPS	WPS

GPS Plug-in
SPS Plug-in
WPS Plug-in

D-Bus   D-Bus   D-Bus

GeoClue library

GeoClue providers

GPS Provider
GPS Plug-in

SPS Provider

WPS Provider

Map Service

Geocode	POI	Route

Map Service Plug-in

Kernel (UART)

GPS Receiver

GPS, GLONASS

External Components

Telephony	Message	Sensor	libnetwork	libxml2	libcurl	libsoup

AGPS Server   WPS Server   Map Service Server

TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

Location Components

Location Library			
Position	Velocity	Accuracy	Boundary
Maps Provider	Gecoding	POI	Route

- A set of APIs providing position information(coordinate, velocity, satellite and NMEA sentences)
- And a set of APIs supporting map service

GeoClue		
Geoclue Position	Geoclue Velocity	Geoclue Accuracy
Geoclue Reverse Geocode	Geoclue Geocode	Geoclue Address

- A geoinformation service having standardized D-Bus (and GObject) interfaces to various geographical data sources

Geoclue Providers		
Position	Velocity	Accuracy
Request	Listener	Reporter
Plug-in		
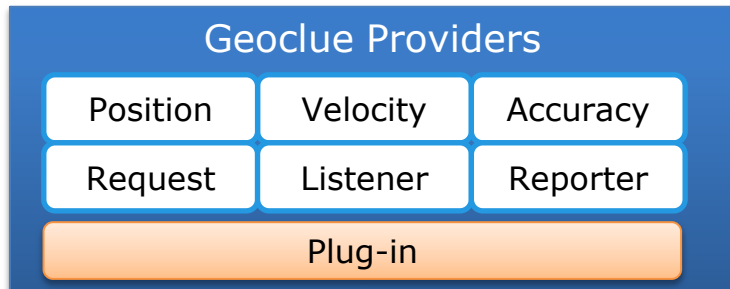
- The processes that provides position information received from various position sources.
- GPS Provider: position received from a GPS receiver
- WPS Provider: position received from a remote WPS Service Server
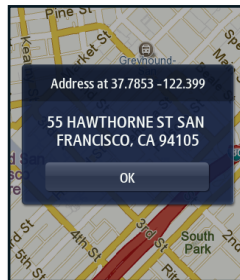- SPS Provider: position integrated with satellites and some sensors

TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

Location Use Cases

Position

1) Position Tracking
- Notify current position (latitude and longitude)

2) Geo-fencing
- Receive a notification when a user enters or exits a boundary
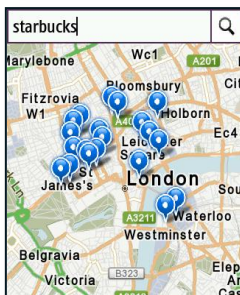
Geocoding

1) Geocoding
- Find geographic coordinates from an address

2) Reverse geocoding
- Find addresses from a geographic coordinate

Route

1) Find route
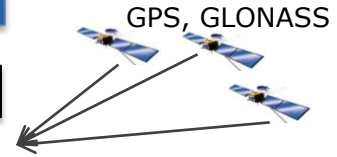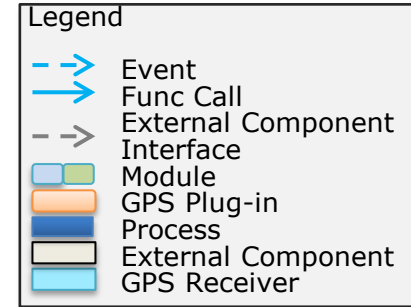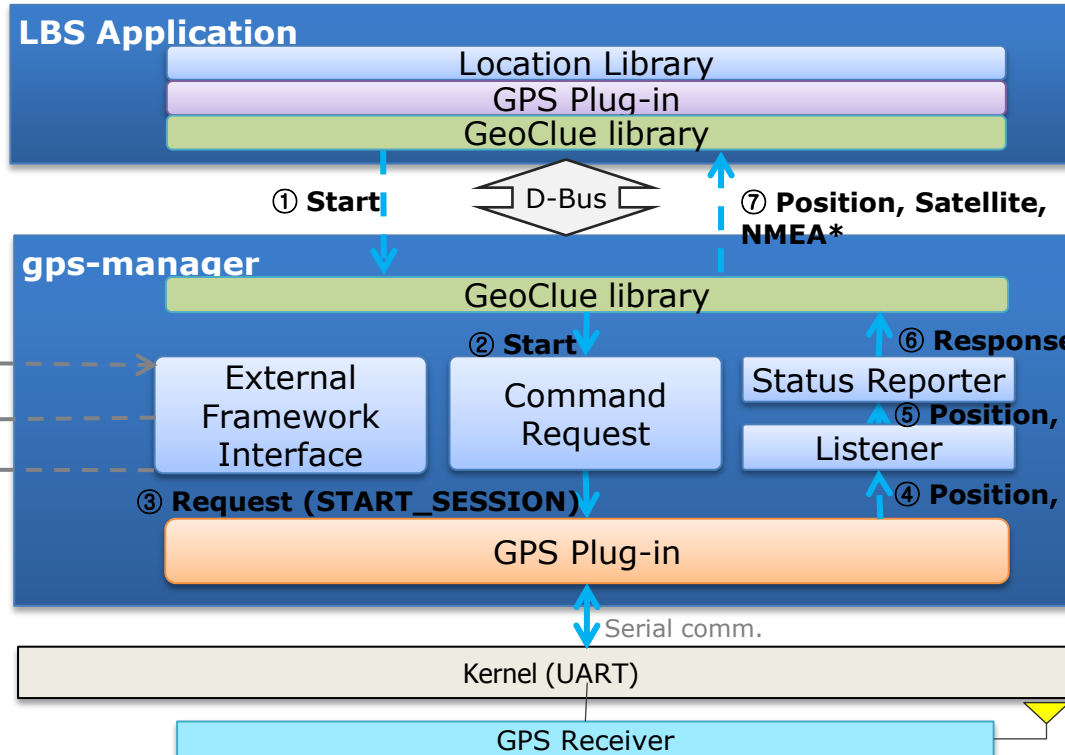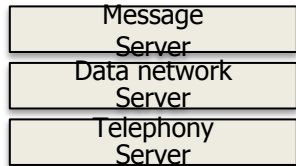- Request directions from origin to destination

POI

**1) Search landmarks**
- Search landmarks nearby current location

TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

How to Interact between Components
| Position Tracking

Legend
- - - > Event
- → Func Call
- - - > External Component Interface
- Module
- GPS Plug-in
- Process
- External Component
- GPS Receiver

LBS Application
- Location Library
- GPS Plug-in
- GeoClue library

D-Bus

① **Start**

⑦ **Position, Satellite, NMEA***

gps-manager
- GeoClue library

Message Server

Data network Server

Telephony Server

External Framework Interface

② **Start**

Command Request

Status Reporter

⑥ **Response**

Listener

⑤ **Position, Satellite NMEA**

③ **Request (START_SESSION)**

④ **Position, Satellite, NMEA**

GPS Plug-in

Serial comm.

GPS, GLONASS

Kernel (UART)

GPS Receiver

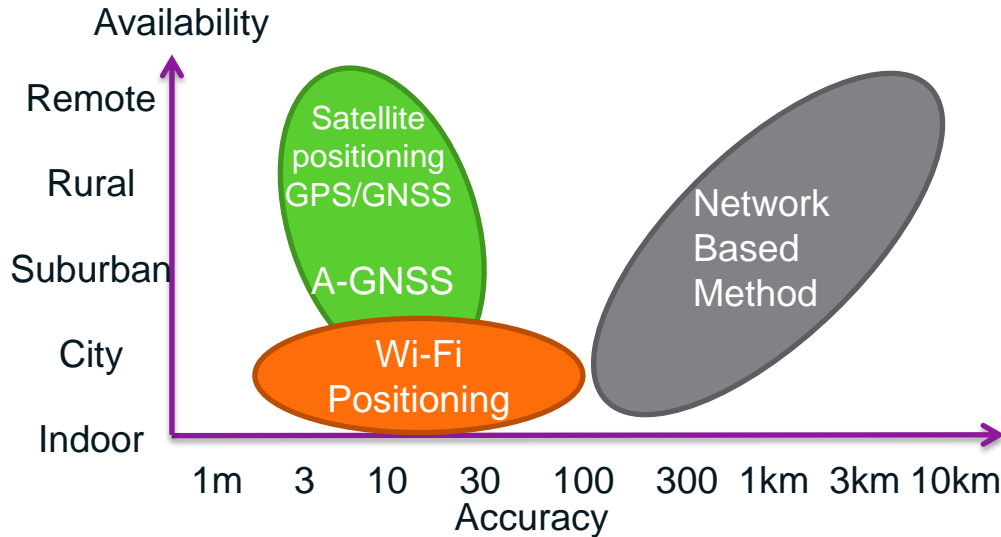TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

Positioning Technologies for Fast Position Fix

- Wi-Fi and Cell-ID based positioning
  - provide fast and accurate location to Wi-Fi capable devices in indoor and outdoor environments

- Standard Assisted GPS (SUPL)
  - Communication between SET and SUPL server is transported over a secured IP connection

- Predicted GPS
  - extends the validity of assistance from 2-4 hours to 7 days. Assistance data is downloaded from a server

- Self Assisted GPS
  - Mobile GPS clients generate assistance data without network connection

GPS data

GPS data

Cell ID

WLAN

WLAN

WLAN

WLAN

Collected data

Positioning data/ Assistance data

Server
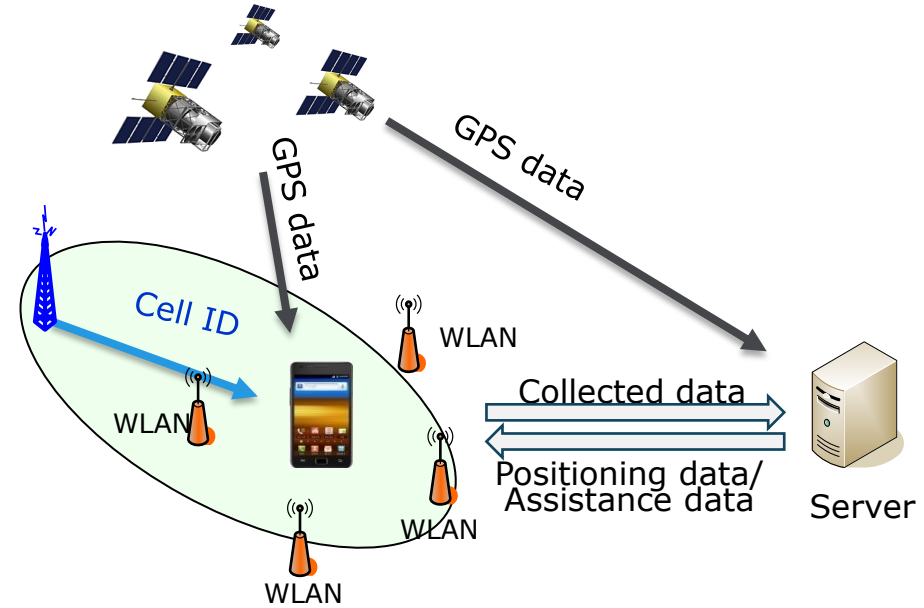
※ WLAN and Cell data are used to positioning

TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

Comparison of Positioning Technologies

Class	Examples
Remote	Open sea, desert, polar regions, and no cell coverage areas.
Rural	Countryside, residential houses, highways.
Suburban	Residential houses (brick or wooden), bungalows, parks, malls, shopping plazas, dense foliage.
City	High buildings and constructions, urban canyons
Indoor	Metal roofed, wooden or concrete walls, office buildings.

[Reference]
Isaac K Adusei, K. Kyamakya, Klaus Jobmann,
"Mobile Positioning Technologies in Cellular Networks: An Evaluation of their Performance Metrics"

TIZEN DEVELOPER CONFERENCE MAY 7–9, 2012

Summary

- Location is designed flexibly:
  - Platform developer can add and remove positioning plug-in
  - Platform developer can select the backend map service
  - A-GPS chipset vendor can develop easily gps-manager's plug-in using Location OAL(OEM Abstraction Layer) interfaces

- Hybrid positioning service
  - A user can select a positioning provider or various positioning providers.

- Positioning service is compatible with standard Assisted GPS
  - Assistance data service for GPS over the standard OMA Secure User Plan Location(SUPL) protocol.

TIZEN™ DEVELOPER CONFERENCE MAY 7–9, 2012

Thank you