TIZEN™

Overview and Architecture

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Contents

- Overview
- Architecture
- Tizen SDK 2.0 Alpha Update
- Core Subsystem
- Conclusion

Overview

There are many smart devices in mobile market.

And, almost as many software platforms for them

Many smart devices
also appear in non-mobile market

User Expectation

Proprietary platforms

- Before smart device,
  - The user knew that they were different.
  - Therefore, the user did not expect anything among them.
- Now,
  - The user is expecting something among them.
  - However, manufacturers provide different applications and user experiences
  - Disappointed about inconvenient and incomplete continuation among them.
    - Due to use of different and proprietary software platforms

Why do they do?

- Why could not manufacturers provide the same platform for their devices?
  - The platform has been designed for a specific embedded device.
  - Manufacturers do not want to share their proprietary platforms.

Proprietary platforms

What if there is..

- **What if there is a standard-based, cross category platform?**
  - The same software can run on many categories of devices with few or no changes
  - Devices can be connected more easily and provide better convergence services to users
- **What if the platform is Open Source?**
  - Manufacturers can deploy the platform on their products easily
  - New features/services can be added without breaking [given the software complies to platform standards]

The platform
having these two features is

✓ Standard-based, **Cross Category Platform**
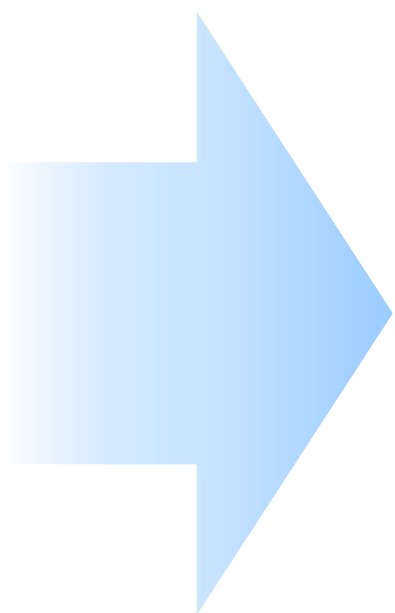
✓**Open Source** Platform

Standard-based, cross category platform

for TV

for camera

for printer

for mobile

for PC

for IVI

for washing machine?

Tizen 2.0 Profiles

Future Profiles

Standard-based,
cross category platform

for mobile

for TV

W3C® HTML5 CSS3

**Provide common &
multiple categories of
compliances**

for camera

for printer

for IVI

for PC

Open Source Project

for mobile

for TV

for printer

for PC

for IVI

for camera

Strong Industry Support
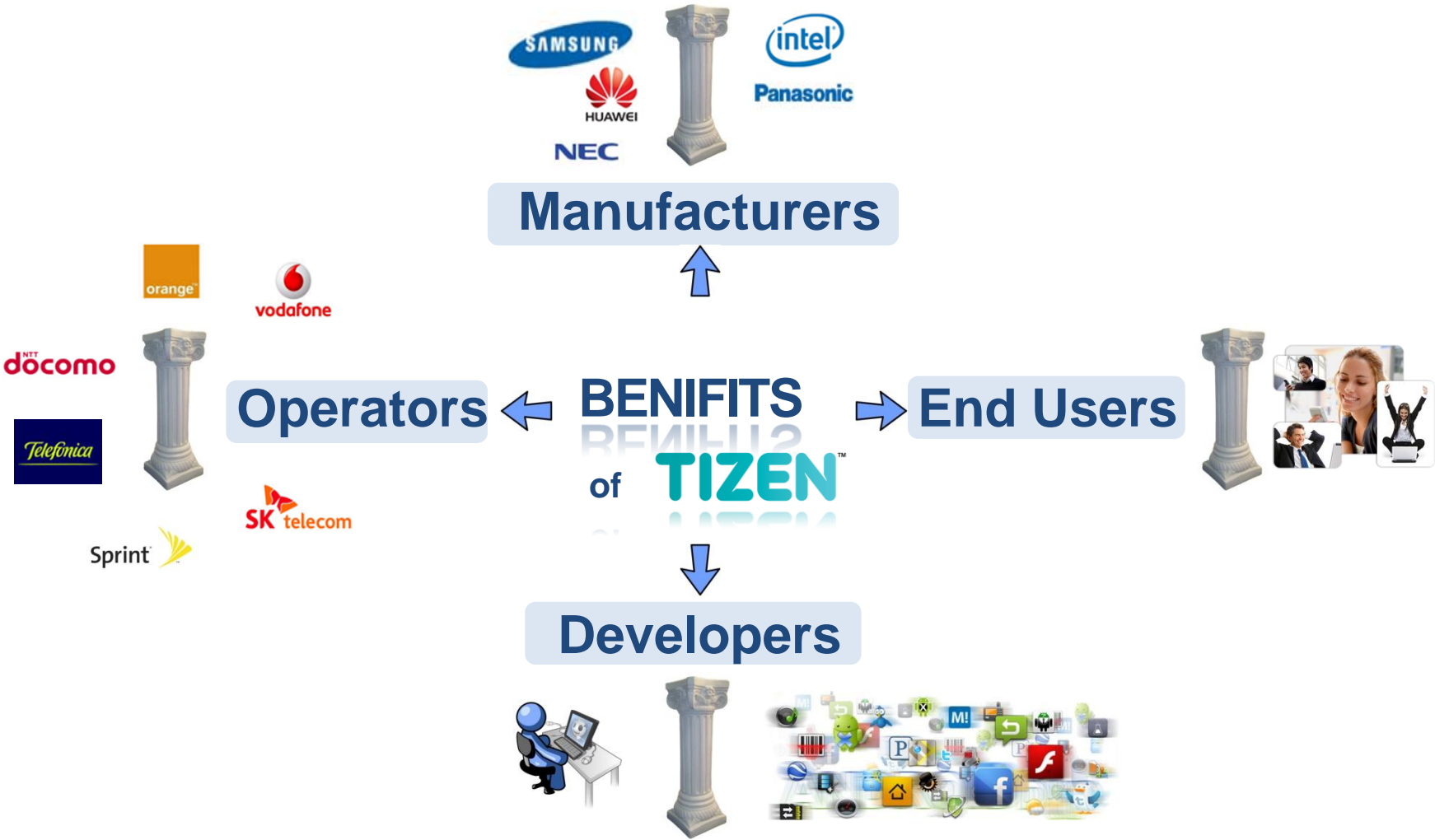
⚙ Guiding the industry roles of Tizen

⚙ Gathering
- ⚙ Requirements
- ⚙ Identification and Facilitation of service models

Tizen Ecosystem

The **most important entities**
for the Tizen ecosystem

Four pillars of Tizen ecosystem

Manufacturers

BENIFITS of TIZEN

Operators

End Users

Developers

Benefit propagation

End Users

Using new product and new services with the application

Developers

Developing applications for new services

Providing new services based-on the new product

Operators

Releasing new product considering cross category devices with short time to market

Manufacturers
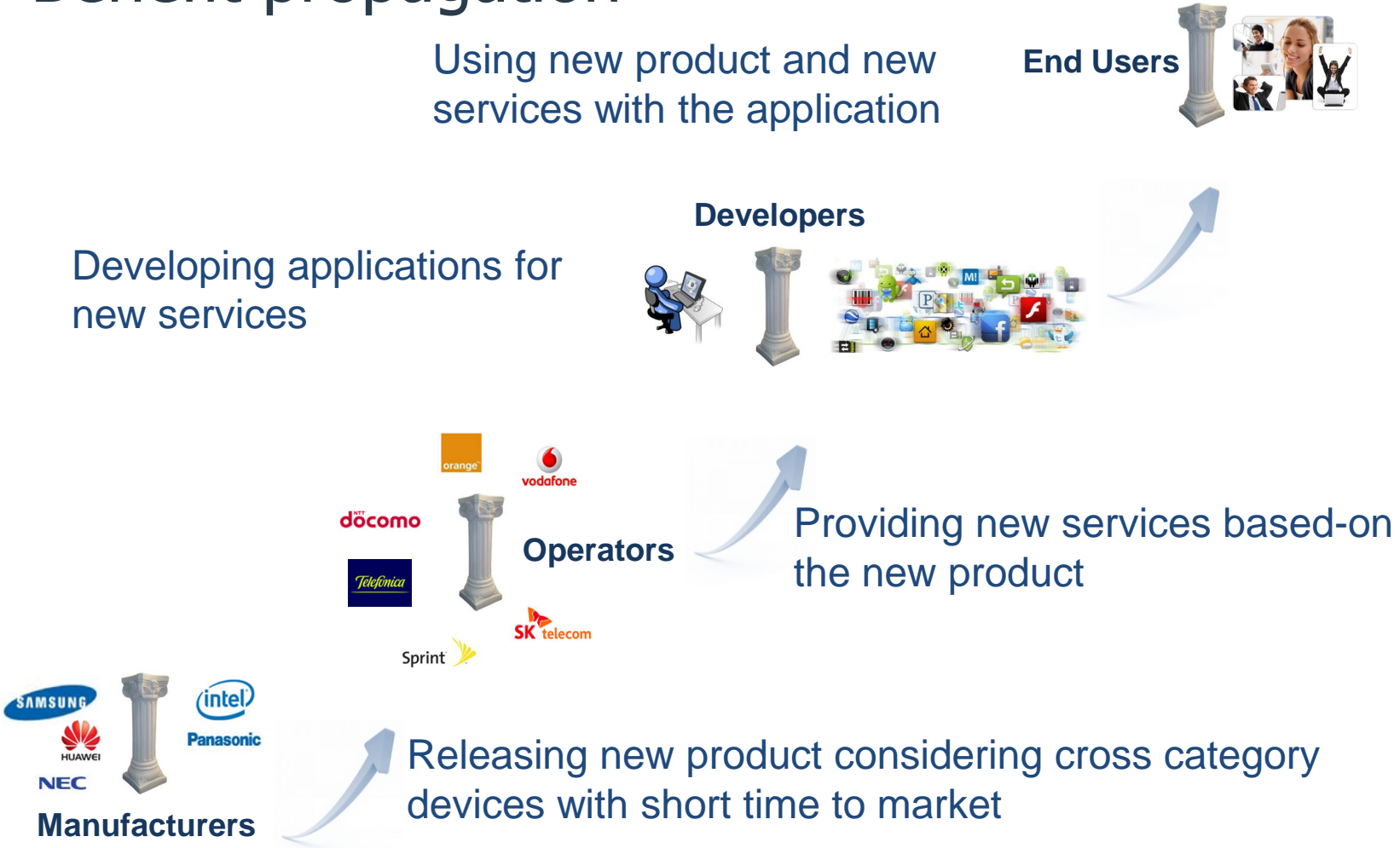
Benefit chain
→ Solid ecosystem

Tizen, When? Where? How?

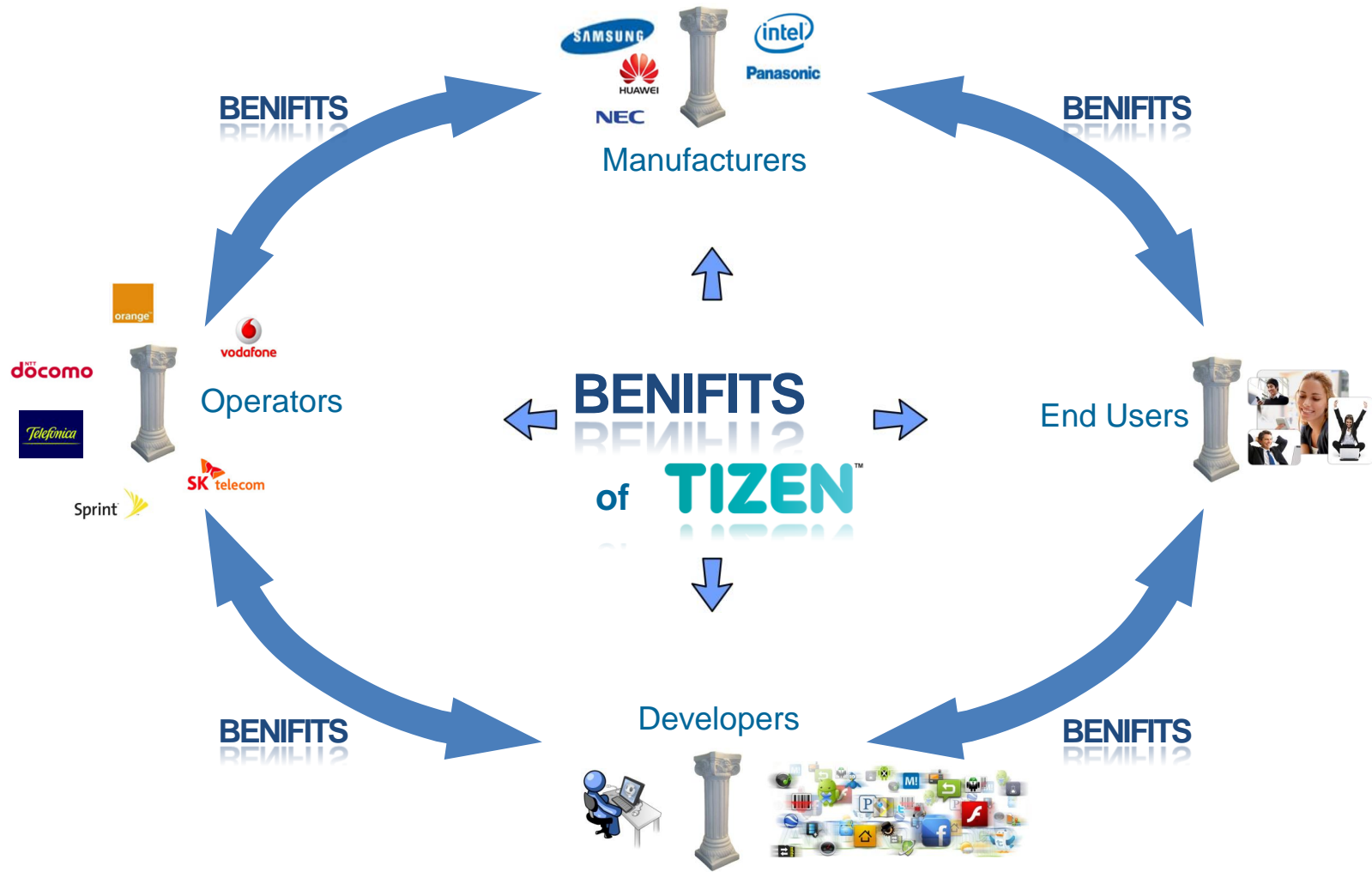# Tizen Releases

- Open Source Release
  - Tizen Alpha, Beta: Jan. 9 2012, Feb. 27 2012
  - **Tizen 1.0 Larkspur: Apr. 30 2012**
  - **Tizen 2.0 Alpha: Sep. 25 2012**

- Tizen Larkspur scope
  - Platform Source Code: Web API, Core Subsystems, Linux Kernel
  - SDK: Web App. Dev. Env. (Host OS: MS-Windows, Ubuntu Linux)

- Tizen 2.0 Alpha
  - Additional Features
    - Enhanced Web Framework (WebKit2), better W3C/HTML5 API support, more Tizen Device APIs
  - Tools
    - Advanced IDE & SDK for Web application development
  - Other Improvements
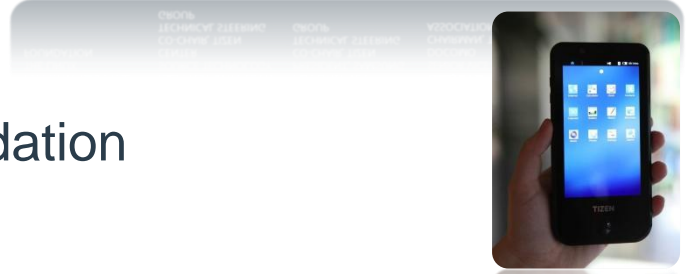   - Platform SDK for platform development based on OBS

Tizen Developer Conference

- https://www.tizen.org/conference
- The first annual Tizen conference
  - Hyatt in SF, CA, May 7-9th, 2012
- Four keynotes
- Forty seven technical presentations
  - About Tizen Platform and SDK
  - On-line slides along with video or audio streaming
- Tizen Developer Contest (~Aug. 7, 2012)
- Reference device distribution by Linux Foundation

TIZEN DEVELOPER CONFERENCE
MAY 7–9, 2012 HYATT REGENCY SAN FRANCISCO

KEYNOTE SPEAKERS

JIM ZEMLIN
EXECUTIVE DIRECTOR, THE LINUX FOUNDATION

IMAD SOUSOU
DIRECTOR, INTEL OPEN SOURCE TECHNOLOGY CENTER
CO-CHAIR, TIZEN TECHNICAL STEERING GROUP

JONG-DEOK CHOI
EXECUTIVE VICE PRESIDENT, SAMSUNG
CO-CHAIR, TIZEN TECHNICAL STEERING GROUP

DR. KIYOHITO NAGATA
SENIOR VICE PRESIDENT, DOCOMO
CHAIRMAN, TIZEN ASSOCIATION

JAMES PEARCE
HEAD OF MOBILE DEVELOPER RELATIONS, FACEBOOK

Tizen Roadmap

- ✿ Tizen 1.0 Larkspur – Apr. 2012
- ✿ Tizen 2.0 Magnolia – Jan. 2013
  - ✿ Native APIs, more Web APIs, Security Enhancements, etc

			2012									2013		
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar

Tizen 1.0

*L*arkspur

Tizen 2.0

*M*agnolia

Tizen Open Source Information

- Visit
    - http://www.tizen.org
    - http://developer.tizen.org/sdk
    - http://source.tizen.org/
    - https://developer.tizen.org/documentation

- Community
    - Mailing lists: http://www.tizen.org/community/mailing-lists
    - IRC Channel: #tizen
    - Wiki: https://www.tizen.org/community/wiki
    - JIRA: http://bugs.tizen.org

Architecture

Tizen Architecture (for Mobile)

SAMSUNG

Applications

Web Applications

Web Framework

W3C/HTML5	Device APIs	Web Runtime

Core

Application Framework	Graphics & Input	Multimedia	Web	Messaging	Location
Security	System	Base	Connectivity	Telephony	PIM

Kernel

Linux Kernel & device drivers
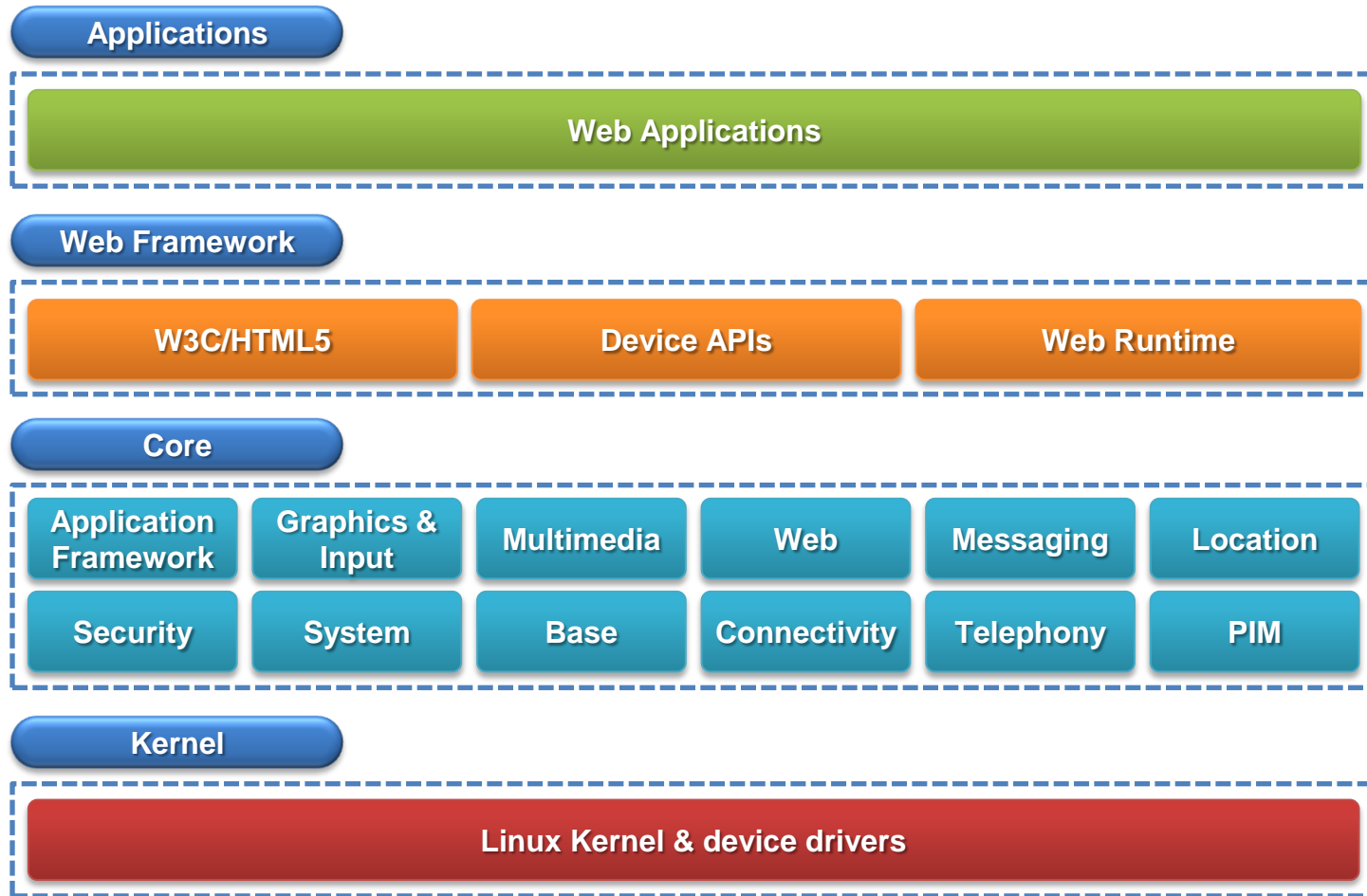
Kernel and Hardware Adaption
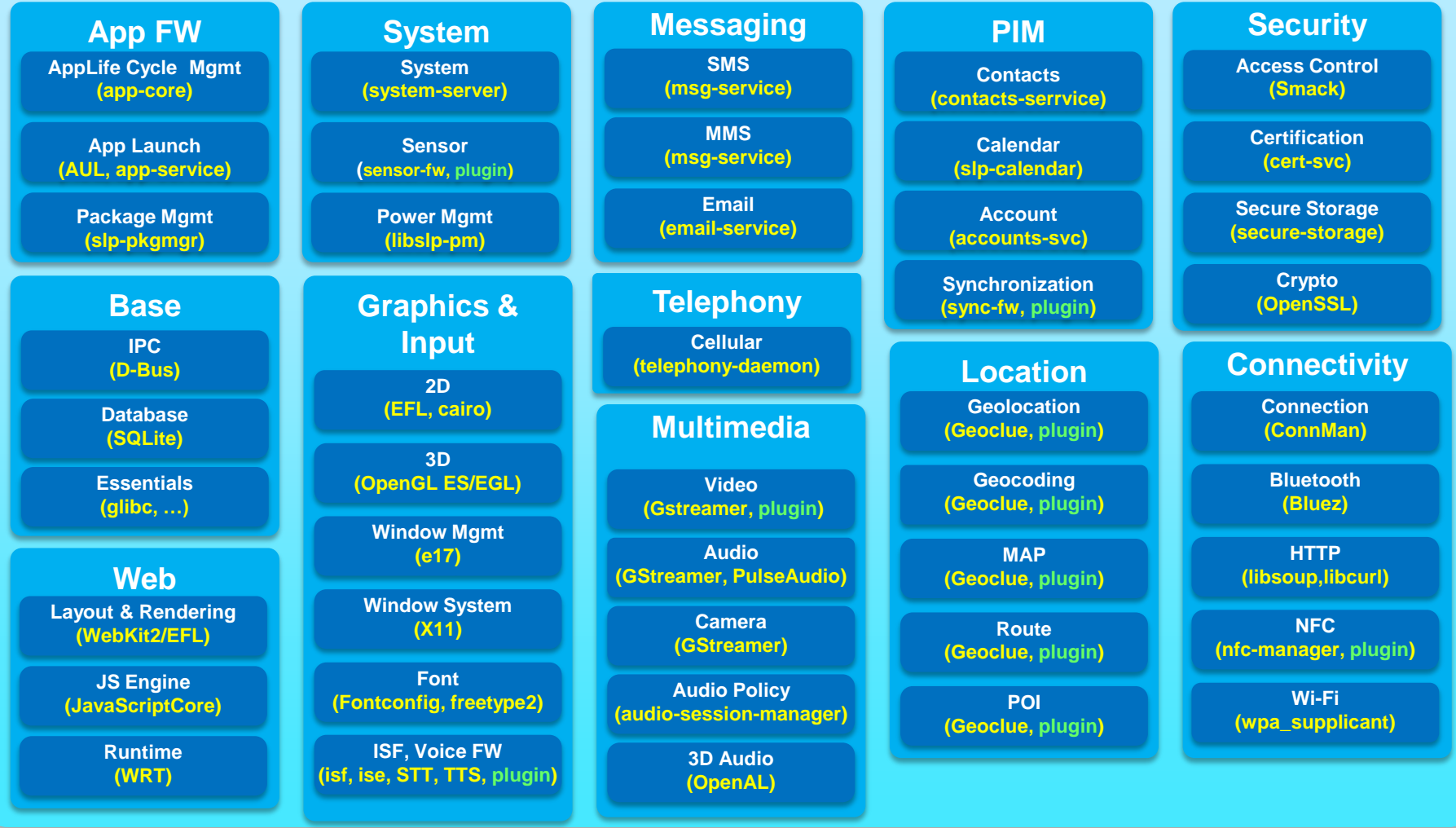
* Features:
  * Linux Kernel
  * Device Drivers
  * Hardware Adaptation Layer
    * Plug-ins
  * OpenGL ES/EGL Graphics Driver
    * DRM-based graphics stack

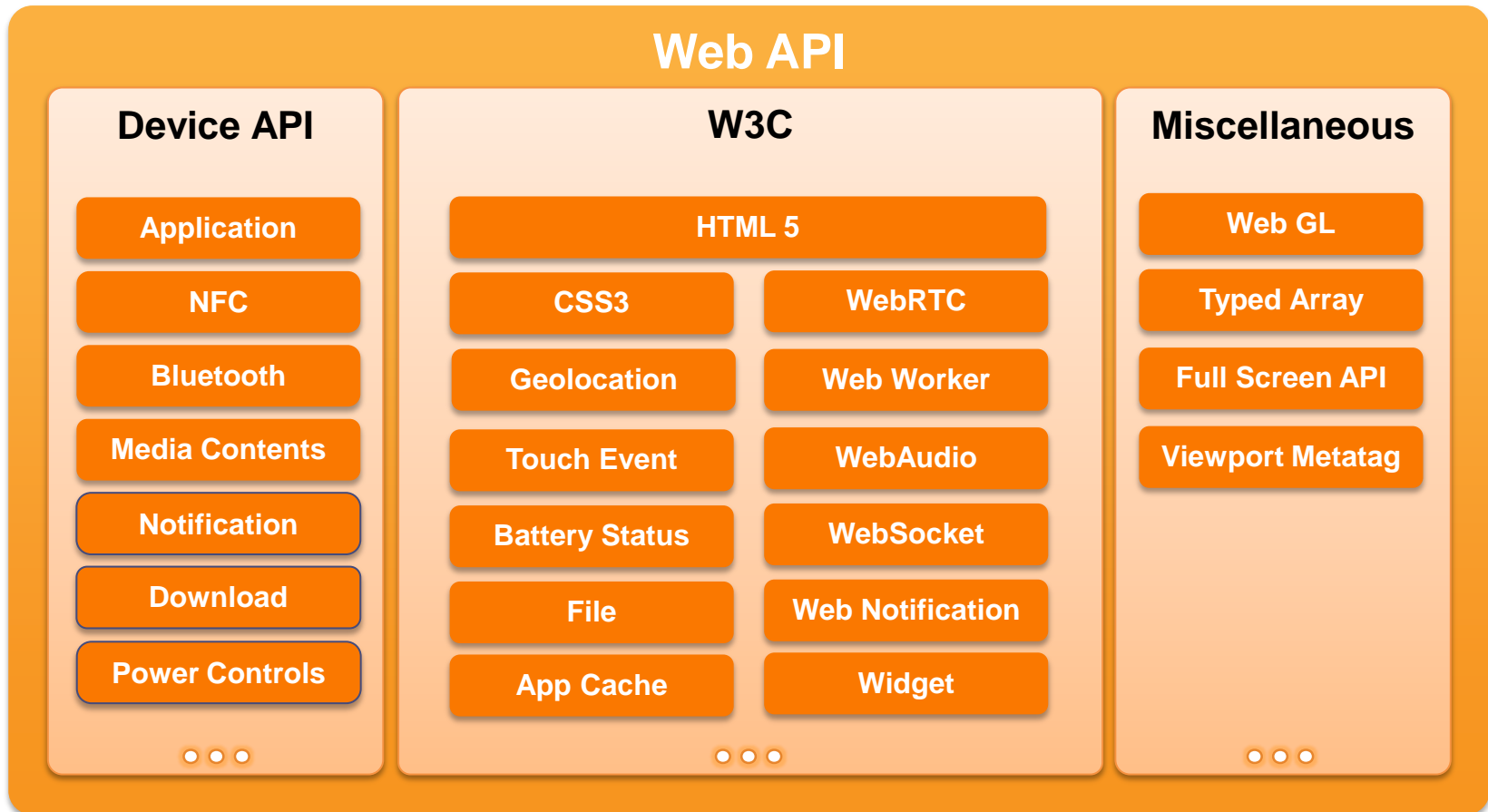**Kernel / HW Adaptation Layer**

HAL (HW Adaptation Layer)

| Telephony Plug-ins | GStreamer Plug-ins | Sensor Plug-ins | System Plug-ins | OpenGL ES/EGL Graphics Driver |

| Kernel 3.x | *SMACK** | Device Drivers |
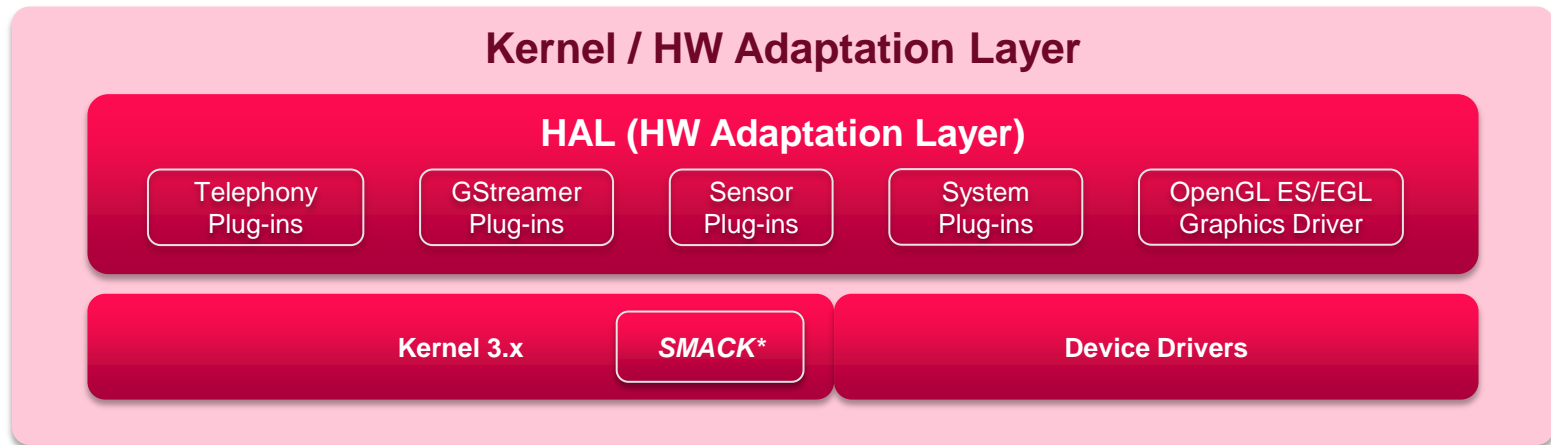
Core (Mobile)

Core subsystems

App FW
- AppLife Cycle Mgmt **(app-core)**
- App Launch **(AUL, app-service)**
- Package Mgmt **(slp-pkgmgr)**

Base
- IPC **(D-Bus)**
- Database **(SQLite)**
- Essentials **(glibc, …)**

Web
- Layout & Rendering **(WebKit2/EFL)**
- JS Engine **(JavaScriptCore)**
- Runtime **(WRT)**

System
- System **(system-server)**
- Sensor **(sensor-fw, plugin)**
- Power Mgmt **(libslp-pm)**

Graphics & Input
- 2D **(EFL, cairo)**
- 3D **(OpenGL ES/EGL)**
- Window Mgmt **(e17)**
- Window System **(X11)**
- Font **(Fontconfig, freetype2)**
- ISF, Voice FW **(isf, ise, STT, TTS, plugin)**

Messaging
- SMS **(msg-service)**
- MMS **(msg-service)**
- Email **(email-service)**

Telephony
- Cellular **(telephony-daemon)**

Multimedia
- Video **(Gstreamer, plugin)**
- Audio **(GStreamer, PulseAudio)**
- Camera **(GStreamer)**
- Audio Policy **(audio-session-manager)**
- 3D Audio **(OpenAL)**

PIM
- Contacts **(contacts-serrvice)**
- Calendar **(slp-calendar)**
- Account **(accounts-svc)**
- Synchronization **(sync-fw, plugin)**

Location
- Geolocation **(Geoclue, plugin)**
- Geocoding **(Geoclue, plugin)**
- MAP **(Geoclue, plugin)**
- Route **(Geoclue, plugin)**
- POI **(Geoclue, plugin)**

Security
- Access Control **(Smack)**
- Certification **(cert-svc)**
- Secure Storage **(secure-storage)**
- Crypto **(OpenSSL)**

Connectivity
- Connection **(ConnMan)**
- Bluetooth **(Bluez)**
- HTTP **(libsoup,libcurl)**
- NFC **(nfc-manager, plugin)**
- Wi-Fi **(wpa_supplicant)**

Tizen Web API

- Standard HTML5 + Tizen Device API
  - https://developer.tizen.org/documentation

Web API

Device API

Application
NFC
Bluetooth
Media Contents
Notification
Download
Power Controls

● ● ●

W3C

HTML 5	
CSS3	**WebRTC**
Geolocation	**Web Worker**
Touch Event	**WebAudio**
Battery Status	**WebSocket**
File	**Web Notification**
App Cache	**Widget**

● ● ●

Miscellaneous

Web GL
Typed Array
Full Screen API
Viewport Metatag

● ● ●

※ Tizen WebAPIs are not forking W3C APIs!

New in 2.0

A LINUX FOUNDATION EVENT
KOREA LINUX
FORUM 2012

Applications

- Web Application
  - Web is the primary application development environment for Tizen
  - SDK is available for Web App development
  - Many sample apps included in the SDK
- Native Application
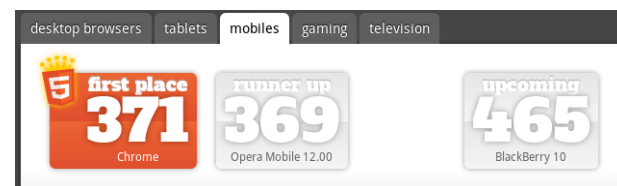 - Available for device implementers through components in Core subsystems

Web application	Native application

Web Framework				Core		
Runtime Core	Tizen Web API Plug-in	Installer Core	App Security Core	App FW	MM	Conn
				Location	PIM	Telephony
Java Script Core	WebKit2			System	Graphics & Input	…
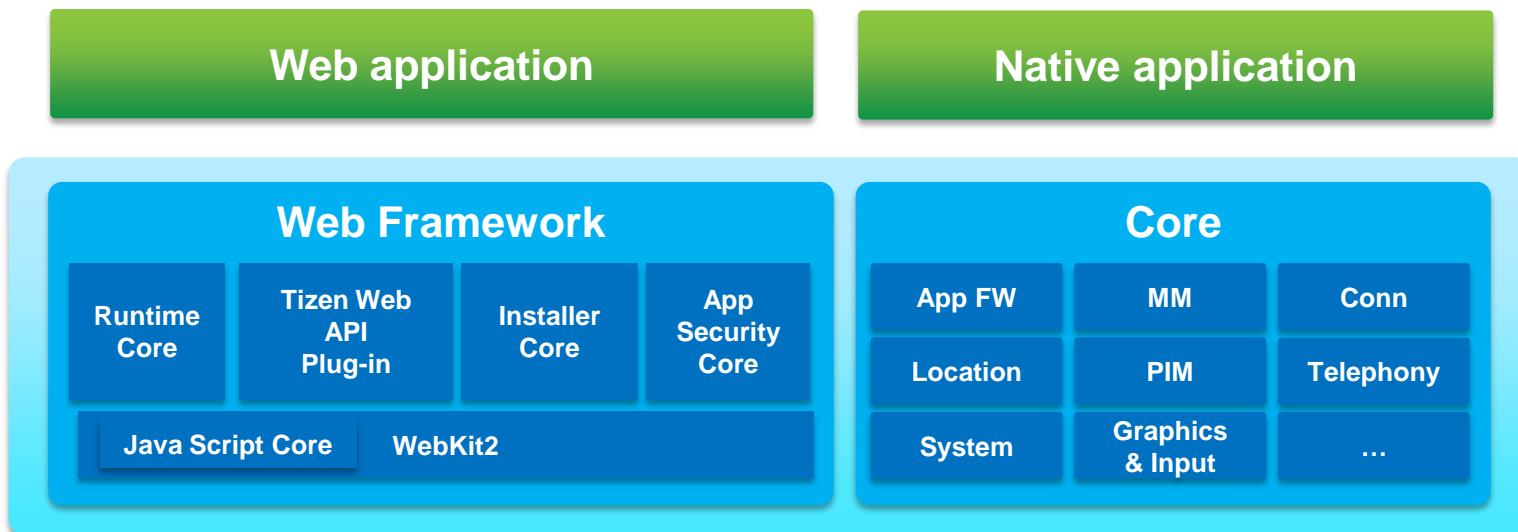
Tizen 2.0 Alpha Update

Web Features Update

- ✺ W3C/HTML5
  - ✺ HTML5 <track> element for playing video with subtitles and captions
  - ✺ W3C battery status API
  - ✺ W3C screen rotation API
  - ✺ Keygen and details elements
  - ✺ 'disable' attribute of the fieldset element
- ✺ Tizen Device API
  - ✺ Downloading remote objects via HTTP requests
  - ✺ Notification for notifying the user of events
  - ✺ Power controls for controlling power resources
  - ✺ System Info. & Contact updates
    - • SIM and Device Orientation added
    - • IPV6 address and connected network type information added
    - • A few attributes and interfaces deprecated

Web Features Update (cont.)

- Web UI Framework
  - Utilities
    - Enable/Disable selection of text for copy & paste
    - Enable/Disable context menu by right-clicking or long-pressing the screen
  - Widgets
    - Shortcut scroller
    - Expandable list
    - Auto-divider
    - Virtual list
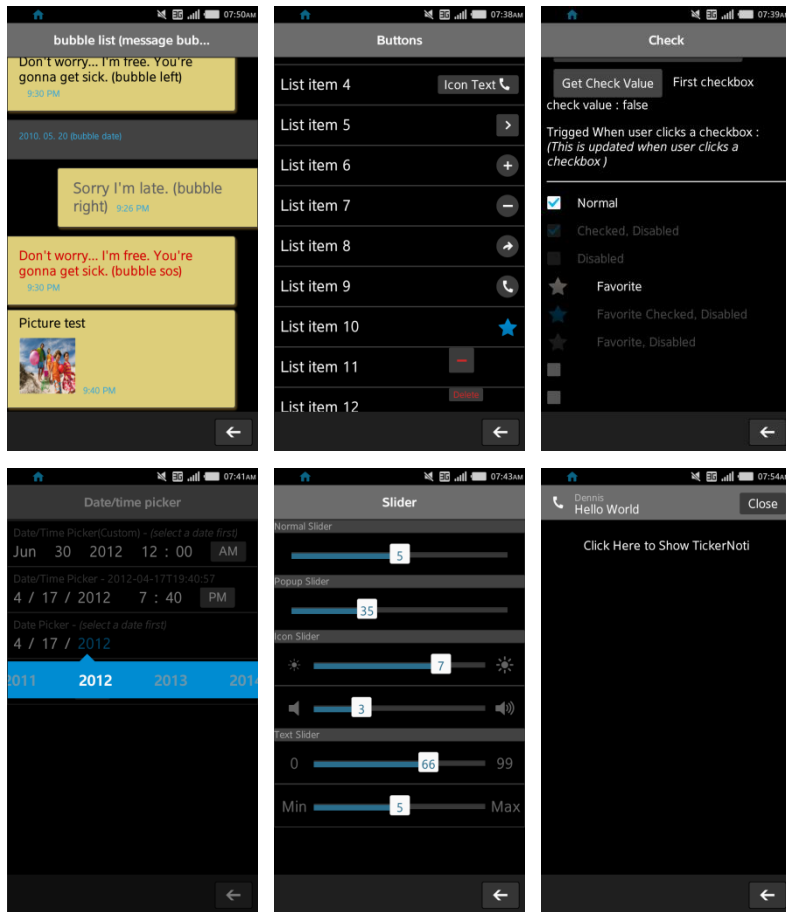   - List divider
  - jQuery Update
    - jQuery version up: 1.6.4→1.7.1
    - jQuery Mobile version up: 1.0→1.1.0
  - Page & widgets specification minor changes
    - Refer to "Release Note": https://developer.tizen.org/sdk/2.0-alpha-release-notes

Web UI Framework Theme Changed

※ Black theme → White theme
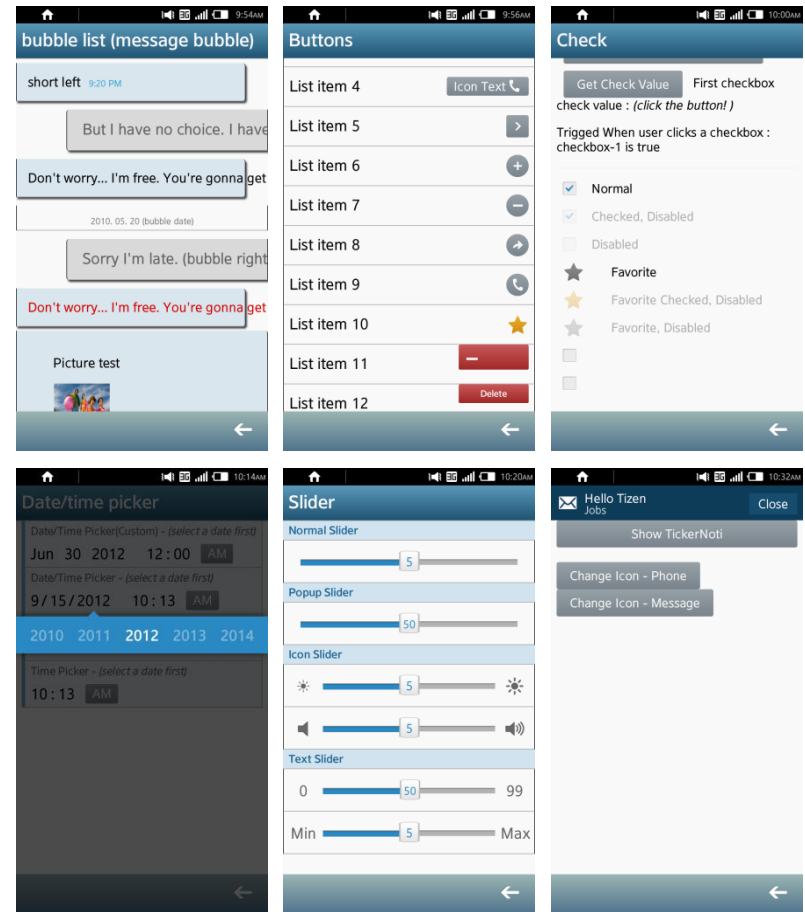
Core Subsystem Update

- Applications
  - Camera: added to reference target
  - Clock: World clock feature added
  - Memo: Genlist sweep functionality added
  - Calculator: GUI changed
  - Email: IMAP folder management
  - Setting: Power saving mode, font, storage, developer option, and display settings added
  - Keyboard: Landscape mode support with White theme
- System
  - New sensor type: Gyro and light
  - USB accessory functionality
  - libusb upgraded: 1.0.9 → 1.0.12
- Telephony
  - New modem plug-ins (telplugin-imc, telplugin-imc-modem)
  - Supporting X-GOLDTM626 modem chipset from Intel

IDE and Tools

- ✿ Common Tools
    - ✿ DIBS: build, package, and install the Tizen SDK
    - ✿ Emulator
        - Enhanced support for OpenGL ES
        - Host HW acceleration on MS Windows
        - HW Acceleration with ATI and Intel graphics cards
        - Other enhancements: https://developer.tizen.org/sdk/2.0-alpha-release-notes
    - ✿ Emulator Manager
        - Multi-byte character path
        - Bug fixes
    - ✿ Install Manager
        - **Platform SDK** with custom installation
        - **SDK image-based installation**
        - Other enhancements

IDE and Tools (cont.)

- Web IDE and Tools
  - Command line tools: packaging, signing, and installation
  - JavaScript Editor
    - Enhanced code visualization and many functionalities
  - Project Wizard
    - Many new samples added
    - Export Wizard for user-defined templates
  - UI Builder
  - Web Simulator
- Platform IDE and Tools
  - Project Wizard
  - Package Manager
- Documents
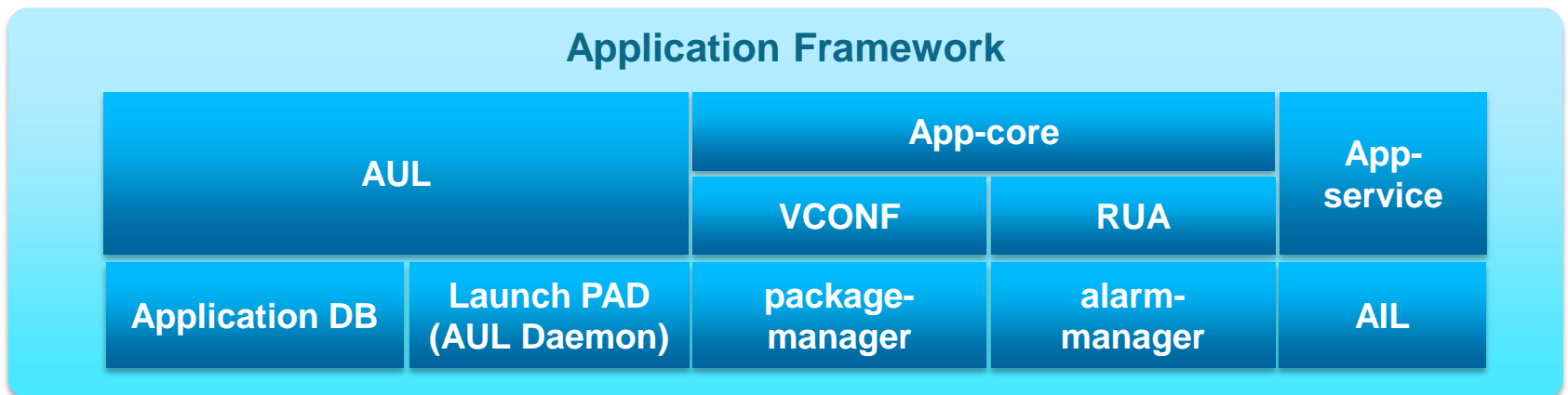 - Getting Started with Tizen
  - Tizen Web App Programming

Core Subsystems

Application Framework

- Provides
  - Launching Application (aul, app-svc)
    - Explicit or implicit information (Combination of Action, URI, and MIME) can be used to determine an app to launch
    - Allowed to launch different type of app (i.e. Web to Native and Native to Web)
  - Application life cycle management and handling system events (app-core)
    - Getting app state change notification or system events through main loop
    - Then, calling registered callbacks for the events
  - Installing/Uninstalling application (package manager)
  - Managing application launched history (librua)
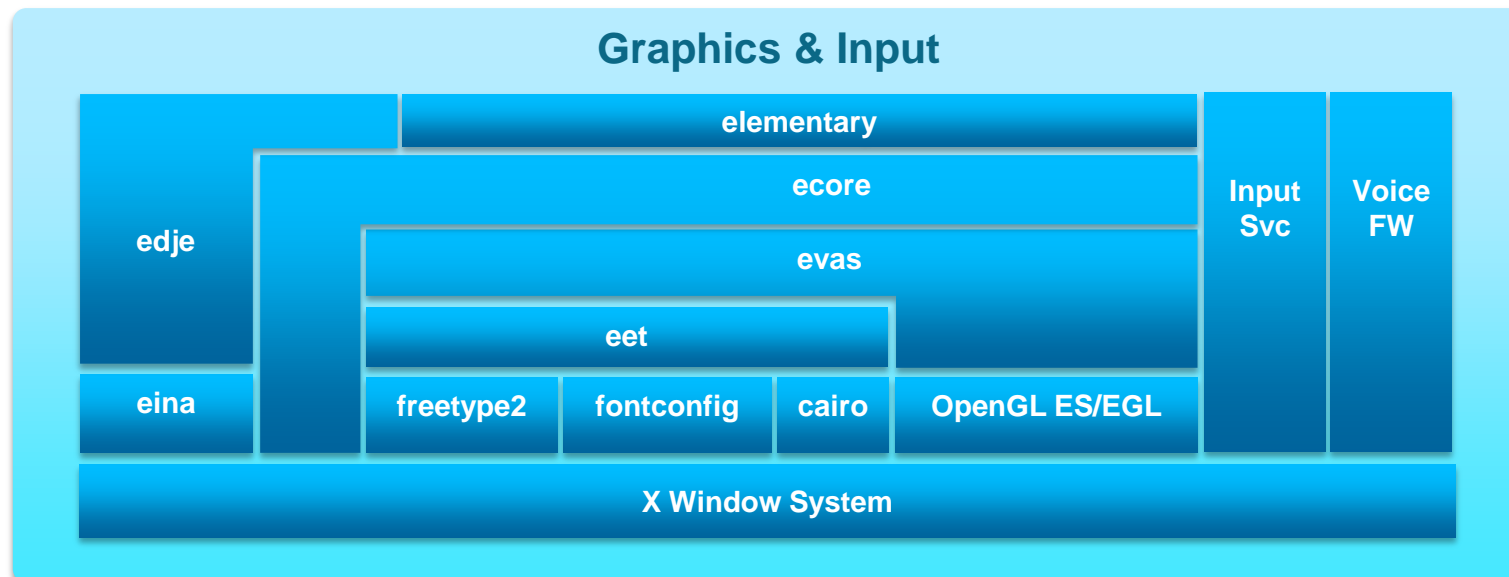 - Setting an alarm to launch at specific time (alarm-manager)

• AUL : Application Utility Library
• RUA : Recently Used Application

Application Framework

AUL	App-core		App-service
	VCONF	RUA	
Application DB	Launch PAD (AUL Daemon)	package-manager	alarm-manager	AIL

Graphics & Input

- Consists of:
  - Enlightenment Foundation Libraries
    - Rich Widgets multiple theme supports by Elementary
    - Retained mode canvas by Evas (Scene-graph, OpenGL ES back-end)
    - Compositing Window Manager
  - Window System based on X11
  - 3D (OpenGL ES), Font (freetype2, fontconfig)
  - Input Service (SCIM), Voice FW (STT, TTS),

Graphics & Input

edje		elementary				Input Svc	Voice FW
		ecore					
		evas					
		eet					
eina		freetype2	fontconfig	cairo	OpenGL ES/EGL		
X Window System							

Graphics & Input: Advanced Feature
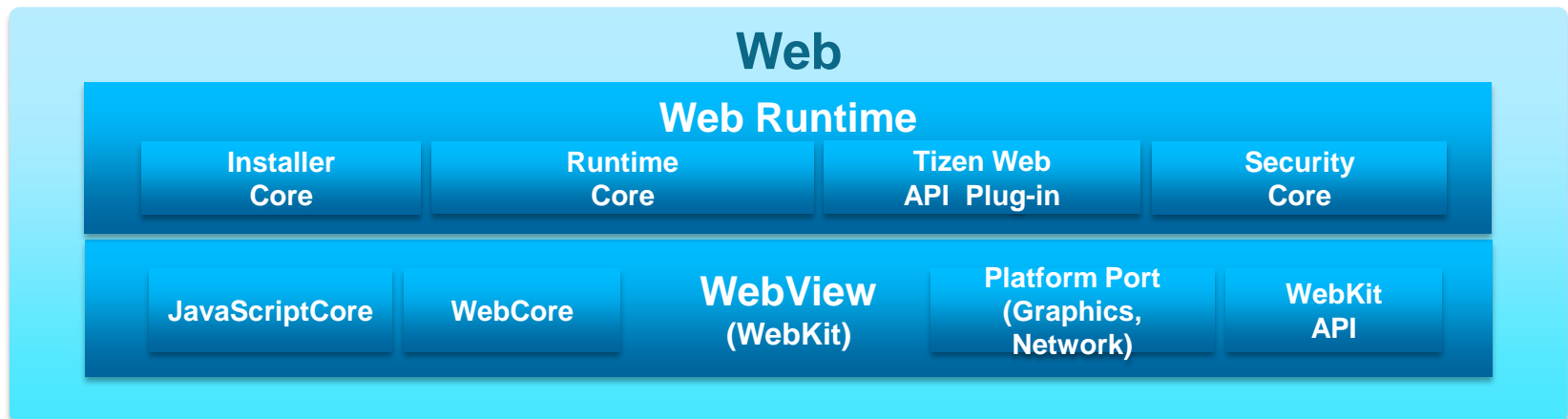
✳ Video decoding on an Evas object
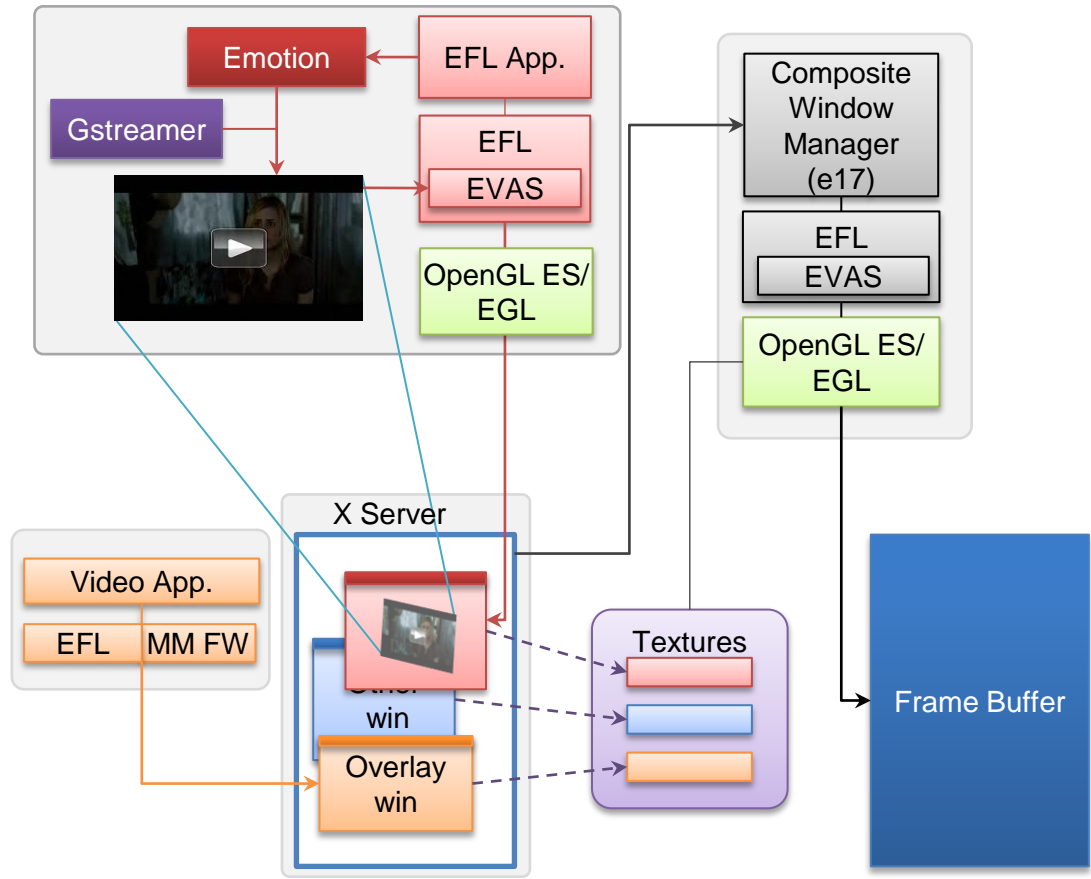
Web

- ❁ Provides:
  - ❁ Best Web experience with Browser and packaged Web Apps
    - Focusing on functionality(HTML5), performance (UI Responsiveness, 2D/3D Acceleration, JS Engine), Standard Compliance(W3C)
    - More device feature accessibility through Tizen Device API
    - jQuery Mobile based Tizen Web UI FW enables easy Web App development
- ❁ Consists of:
  - ❁ WebVeiw (WebKit2/EFL): JavaScriptCore, WebCore(HTML5/W3C API implementation), WebKit API
  - ❁ Web Runtime: Execution environment for packaged Web Apps

Web

Web Runtime

Installer Core	Runtime Core	Tizen Web API Plug-in	Security Core

JavaScriptCore	WebCore	**WebView (WebKit)**	Platform Port (Graphics, Network)	WebKit API

Multimedia (1/2)

- Provides:
  - Playback of audio and video contents (local and streaming)
  - Capturing images and recording audio and video
  - 3D Audio Sound (OpenAL) specially for games
  - Scanning & Playback of radio
  - Determining audio policy
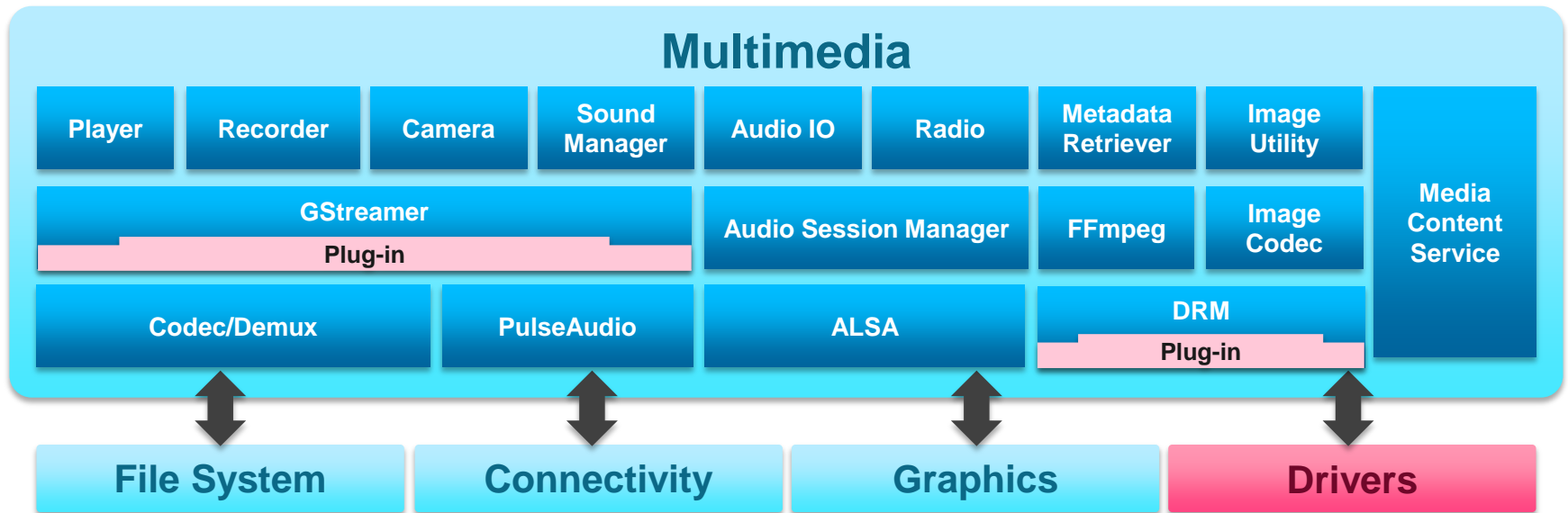 - Extracting and displaying media content information
- Features:
  - High Quality Video Playback
    - Full HD(1080P) Playback (with HW codec & Render Optimization)
    - Support for various kind of Multimedia Streaming (HTTP, RTP/RTSP)
    - Support for HTML5 Video and embedded playback in Web Browser
  - High Quality & High Speed Camera/Recorder
    - High Quality Image Capture & Video Recording
    - Support for various kind of shooting mode (single,continuous,paronama,etc)

Multimedia (2/2)

✿ Key Components:

  ✿ GStreamer: Audio, Video, Recording, Streaming, Editing, Etc

  ✿ Audio Session Manager: Sound Policy Management

  ✿ PulseAudio: Software mixing multiple audio streams

  ✿ Multiple-Format Codec: Various support of codec

  ✿ Media Content Service: Content management for media files

  ✿ Audio I/O: Accessing raw audio buffer to manipulate

Multimedia

Player	Recorder	Camera	Sound Manager	Audio IO	Radio	Metadata Retriever	Image Utility	Media Content Service
GStreamer / Plug-in				Audio Session Manager		FFmpeg	Image Codec	
Codec/Demux		PulseAudio		ALSA		DRM / Plug-in		

File System	Connectivity	Graphics	Drivers

Connectivity

- Cellular and Wi-Fi Connection
  - "Always-on" internet connections based on cellular(e.g.3G) and Wi-Fi .
  - connman manages internet connections
    - Allowing automatic connection for available Wi-Fi access point
  - Managing statistics of data network
- Bluetooth
  - Based on Bluez and profiles (OPP, A2DP, RFCOMM, HFP, HDP, etc)
  - Discovering / bonding / exchanging data with remote devices
- Tethering
 - Providing three type of tethering : USB, Bluetooth and Wi-Fi
- NFC
  - Including NFC Manager to handling NFC plug-ins
  - Supporting P2P, Controlling NDEF tag, car emulator
- Wi-Fi
  - Scanning and connecting Access Points
  - Connecting hidden Access Points

Telephony

- Verified open source telephony stack
  - It is a proven qualified stack with dominant industry modem chip vendors
  - Applications in Tizen are already implemented on Tizen Telephony stack.
  - It supports well-defined interface with ConnMan
- Providing benefits for commercialization
  - Flexible plug-in architecture for manufacturer 's customization
  - GCF, PTCRB-certified stack
  - Manufacturer can make commercial product without license burden
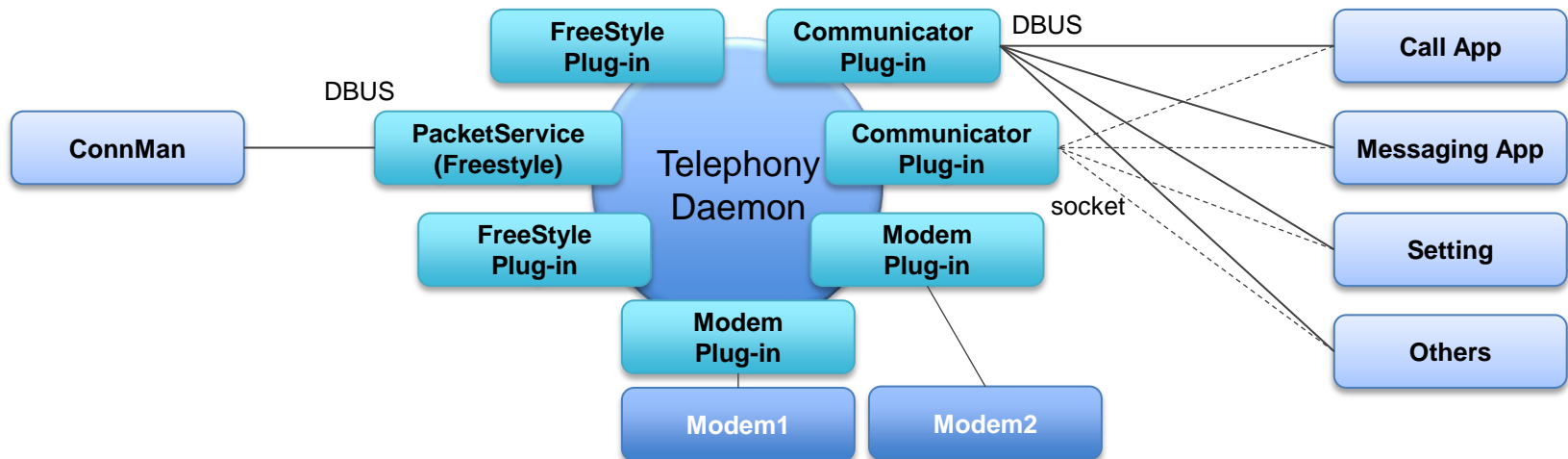
*GCF : Global Certificate Forum
*PTCRB : PSC Type Certification Review Board

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Conclusion

- Standard-based, Open Source software platform under Linux Foundation

- Offering an industry leading HTML5-based application APIs for various categories of smart devices

- Updates in Tizen SDK 2.0 Alpha

- Architecture
    - Kernel
    - Web Framework
    - Core Subsystems

- Continuously evolving platform

Thanks

Q&A