

IoT Combined Service Development based on
Web Payment Standards

PAYTO
: Web Payment Service prototype

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Solutions Development Team



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- ✓ There has been a dramatic improvement in Mobile technology. As a result, a new service area called Fintech which has garnered much attention in the industry has led to many case studies and business models to further infiltrate into people's lives. The purpose of the project is to present new ideas for development of a mature payment method to market.

To maintain mobile and web based technology for further extension of FinTech services

Customer demand analysis to provide relevant services to increase customer adoption and increase SKT's brand awareness

Provide web standard-based services to maintain foundation technique for extension of future services and improvement in service productivity

Project Background and Goals

FinTech. to web based services

- ✓ One click payment services are expanding to web bases.
- ✓ Industries are moving towards web browser bases and making efforts to reduce discomfort of downloading additional applications.
- ✓ New methods such as a P2P money transfer service is using e-mail and messenger interface.

Growing expectations on online payment

- ✓ The customer has high expectations of simple/secure/reliable online payments.
- ✓ There are no characteristics on existing payment services with a few payment options.

Fast movement in providing web standards-based payment service

- ✓ There are various payment services in the market using their own scheme without industry consensus can discourage the customer to adopt web payments.
- ✓ One click payment technology is expecting to be a web standards and it will be adopted by the browser.

- ✓ It is important to have preceding research on online payment services based on standard technology such as HTML5 and IoT with the market test to strengthen the technology in web-based payment services and to expand business area.

◇ SKT's Reaction Plan

Added Values of Web Payment Standardization

Easy Accessibility

- One Source, Multi Use
- Compatible with most of the OS and the browser
- Compatible with all devices such as mobile phones, tablets and PCs.

Security Improvement

- Security improvement with standardized secure/ authentication protocol
- Fraud prevention and protection of privacy of all participants by not disclosing private details.

Usability enhancement

- UX improvement with standardized/ identical payment initiation (Current cart abandonment rate is 72%, on the mobile, cart abandonment expecting to decrease by 97%)

Web Payment Deliverables	
1	PAYTO <ul style="list-style-type: none"> • Web Payment standards that the sender is the subject of the payment
2	Signing HTTP Messages <ul style="list-style-type: none"> • Enables a Web client or server to authenticate and authorize the HTTP message by using HTTP protocol
3	Payment Intent <ul style="list-style-type: none"> • Displays a set of payment instruments when the sender is about to make a payment
4	OAuth Authentication <ul style="list-style-type: none"> • The method which client authenticates through the resource server without disclosing private details to 3rd party applications.
5	Price Index <ul style="list-style-type: none"> • The currency exchange automation scheme that allows the customer and merchants to make a payment and receive money with their preferred currency.

Expected Effects

Preemptive web standards-based technical development to preoccupy the market.

Improvement of current payment technology with enhanced competitiveness

Discovery of New Tech. Driven business model.

- ✓ The payment service market is changing dramatically and to lead mainstream payment service, SKT is preparing a variety of payment services. During this project, web payment service and technical development will be phased and established through methodical approach.

◆ Phase 1 (EOY 2015)

Technical development on Payto web-based service and discover business model

Payto Technical Development

Details	Deliverables
<ul style="list-style-type: none"> ✓ Payto based client agent development ✓ Web-based payment data messaging and authentication technology development 	Browser Agent
<ul style="list-style-type: none"> ✓ Offline payment technology development through beacon 	Client App

Web Payment Service Models

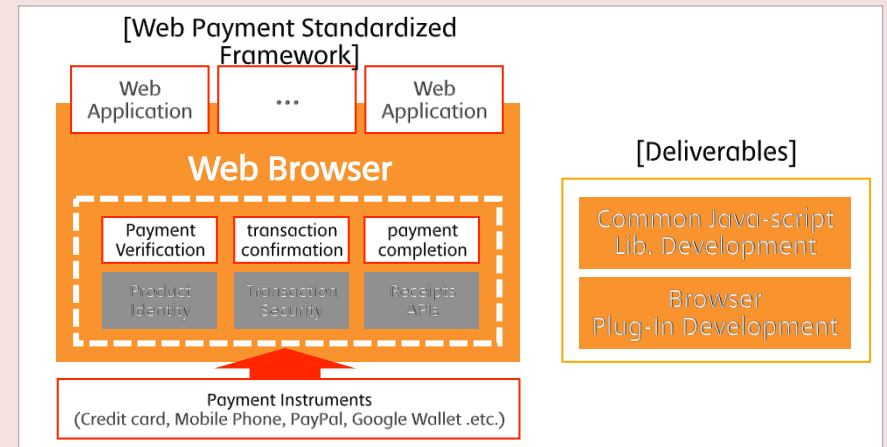
Details	Deliverables
<ul style="list-style-type: none"> ✓ Prototype service development , such as delivery and donation - Cooperate with business teams to carry out prototype service (Cooperate with the IoT solution team and other relevant teams) - Cooperate with 3rd parties such as a church, the Salvation Army to carry out pilot service 	Client, Server Combined Service System

◆ Phase 2 (2016~)

Standardized service framework development according to W3C standardization

- ✓ Payment framework development on web standards-based wallet with payment verification(asset, authentication), transaction confirmation (payment process, confirmation) and payment completion (receipt, transaction history).
- ✓ Apply technologies through participating in W3C standardization and strengthen the internal business.

Web Payment Standardized Framework





W3C, Web Payment, Payto

Payto standard allows the payer to ‘transfer certain amount money to others’. It enables the payer to transfer money, fast and easy, through PAY ADDRESS. The payer has the authority over the whole payment process.



PAYTO://₩10,000.terry@nate.com



- 1 Payto Technical Standard (PREFIX)
- 2 Payment Amount (Transfer Amount)
- 3 Recipient 's IDENTITY (E-mail, Mobile Number, Bank Account etc.)

✓ Payto Specifications

Payto protocol provides peer-to-peer money transfer service and simple checkout solution to the user. It is a similar way to writing an e-mail according to mailto protocol.

Followings are Specifications for Payto:

1 **2** **3**
payto://PaytoAddress,Amounts

1 **2** **2.2** **3**
payto://PaytoAddress,ServiceName,Amounts

1 Payto Technical Standard | prefix

2 Payto Address | email, phone, id

2.2 Service Name | service name

3 Amounts | Amounts(sets to local currency)

1. Case using one parameter (ex: payto://P2P@example.com)

It is generally used in peer-to-peer money transfer service. The parameter is the Payto address, which is linked to the recipient's account and it opens checkout page which a user can set amount for the money transfer.

2. Case using two parameters; when the second parameter is a number (ex: payto://P2P@example.com,20)

If there are two parameters in Payto, the first parameter expected to be the Payto address, which is account-linked address such as an email. When the second parameter is a number, it automatically sets the payment amount on the checkout page.

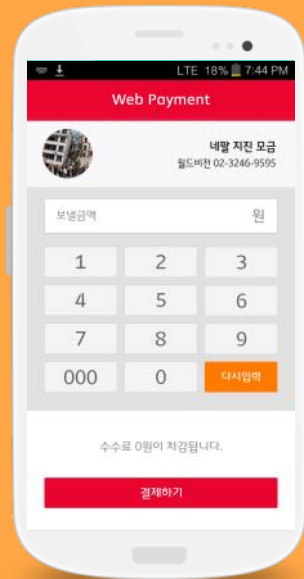
3. The case when the second parameter is a string

(ex: payto://Service@example.com,ServiceName,Amounts, payto://P2P@example.com,ServiceName)

If the second parameter is a string, It generally used to express particular service or the recipient's financial account. It allows the user to manage various services and financial accounts with one Payto account. In this case, the first parameter is expected to be the Payto address, the second parameter is expected to be the service name and the last parameter is optional which represents the amount for the provided service. By doing so it opens up the checkout page for the relevant service.

About SK Telecom Web Payment

Payto is a money transfer service featured with push payment method.
It is a handy method of payment since it can be used like cash!



The payer has the authority over the payment process.
The payer sets the payment amount and leads the payment process.





Guard against the unwanted leakage
It uses a push payment method that merchants' electronic invoice requests for the payment to the payer's financial institution.
There is no need to share the card relevant information to others.



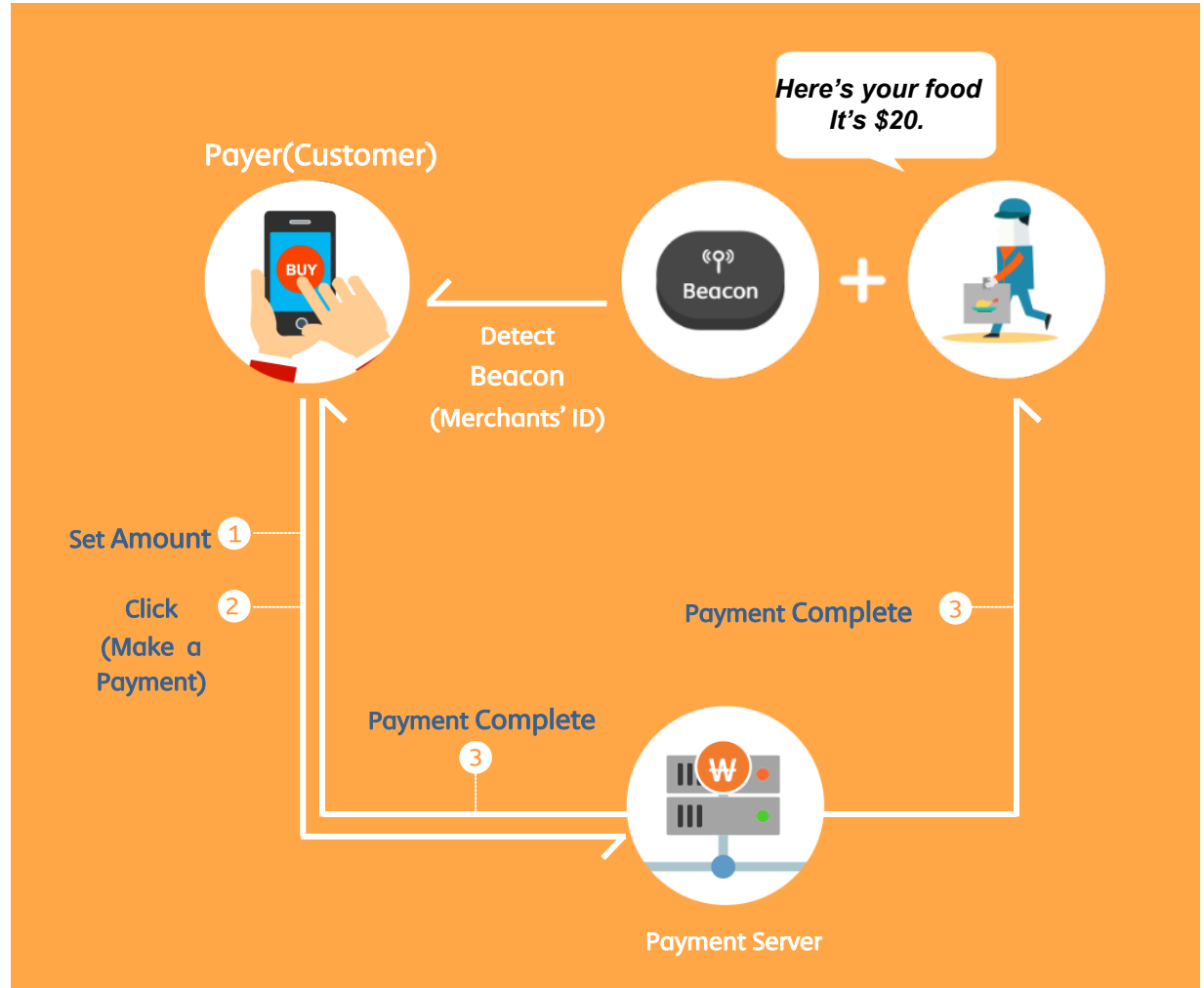
It comes very handy!
It makes a one click payment easier.
Digital receipt allows to manage transactions much easier.

Push VS. Pull Payment Process

	Push	Pull
Payment Process »» Comparison Items ≡	<p>The payer sets the payment amount and leads the payment process.</p>  <p>Payment Request > Payment System > Informs Payment Result</p>	<p>The merchant sets the payment amount and the payer checks the amount.</p>  <p>Informs Payment Result < Payment System < Payment Request</p>
Payment Instruments	Cash, Payto, Credit Card Transfer	Credit Card and Most of the Electronic Payment Systems
Transaction Info.	Invoice (Payto Address) / Digital Receipt	Personal Information, Informs Payment Result
Authority	Payer's Web Wallet	Server
Unwanted Leakage	Very Low (Eliminates Payer's Financial Information leakage)	High (High possibilities of unwanted leakage)
Payer Options	High	Very Low

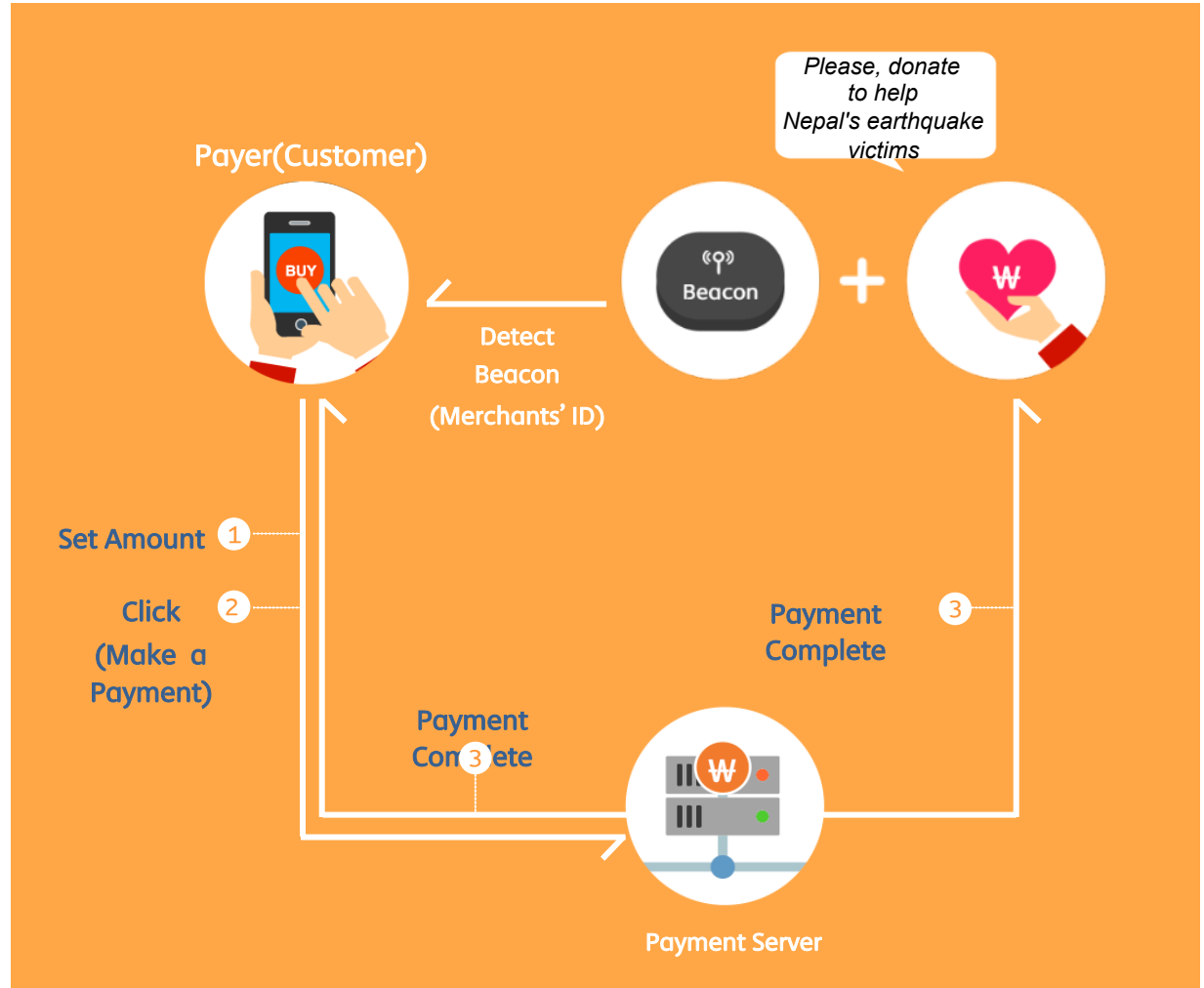
- ✔ It is a service model using Payto and beacon. It is more secure and convenient than existing payment methods.

One Click Payment
On
Delivery Service

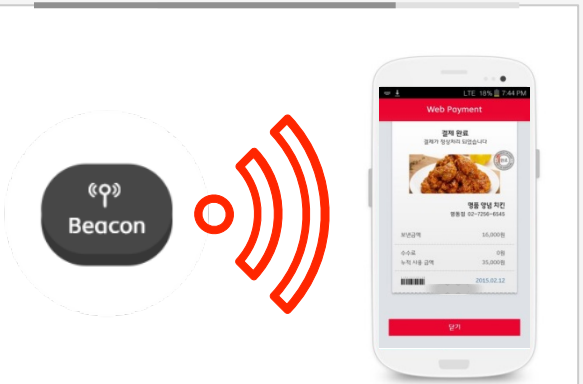


- ✓ High accessibility can be achieved by Payto and beacon. There is no need to share the payer's finance information with the service provider or merchant.

One Click Payment
On Donation and
Monetary Gift



Linkage Between Payto associated App with beacon

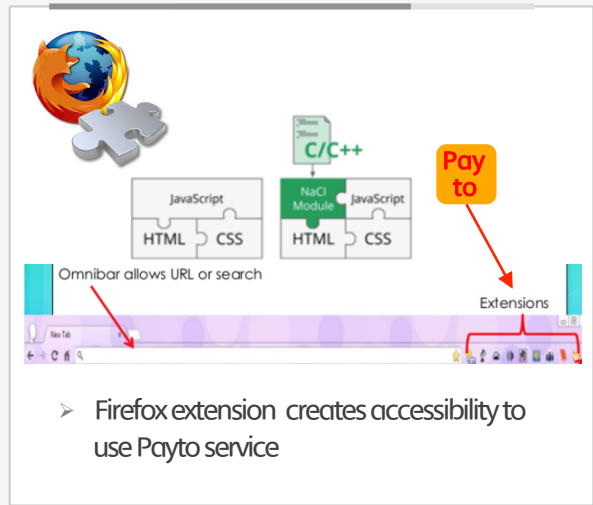


- Beacon broadcasts UUID periodically
- The app receives beacon's UUID and request sever to identify registered service according to UUID.
- The app sends payer's information to Payto server for authentication/verification process.
- Beacon increases accessibility to use Payto service

Payto features Through Firefox Extension

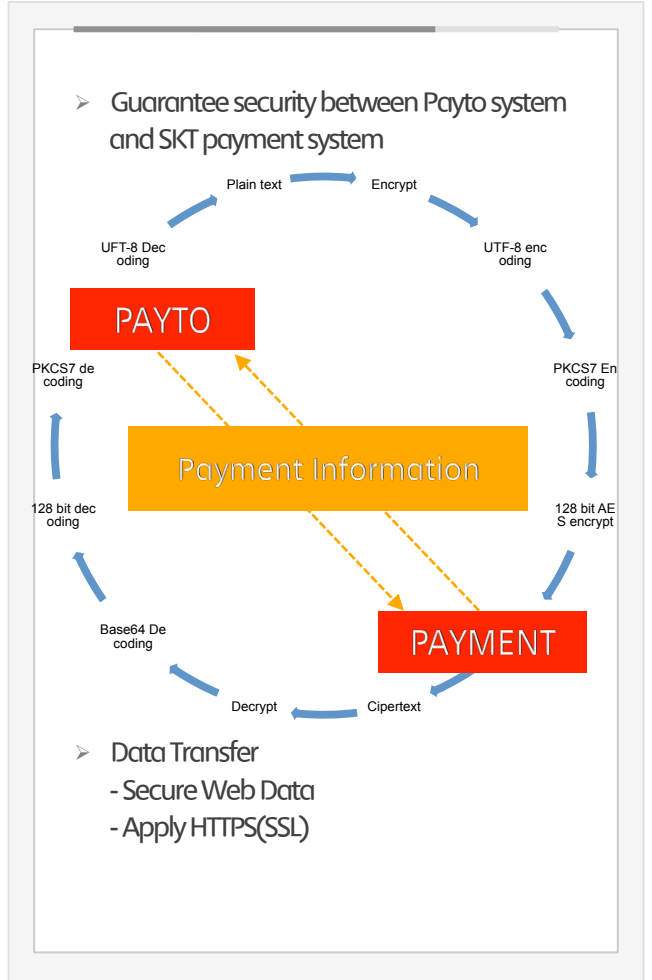
The section features the Firefox logo and the following text:

- Develop Payto associate App in Firefox add-on store
- Configure Firefox extension for Payto service

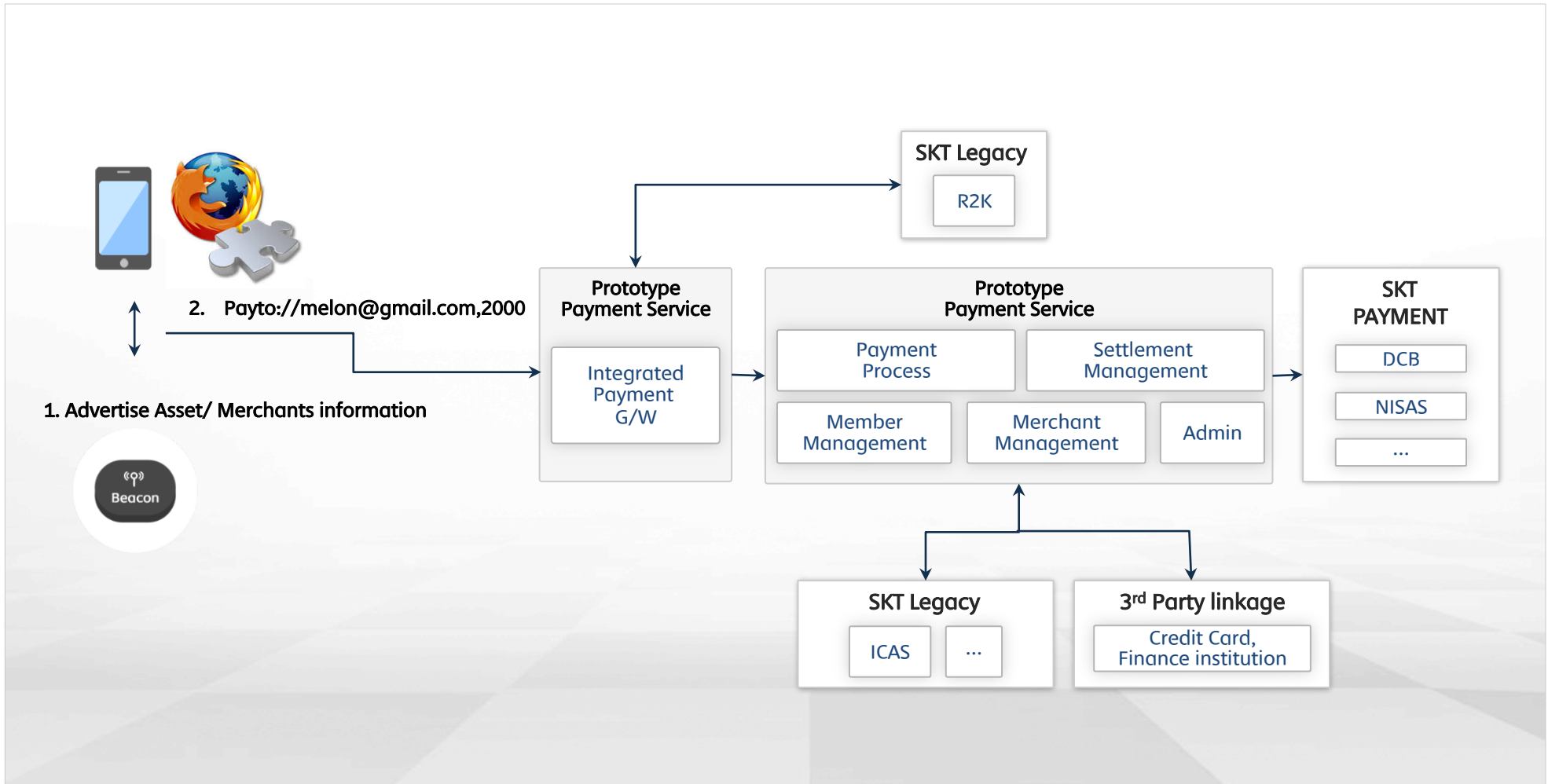


- Firefox extension creates accessibility to use Payto service

Security association between Payto system with payment system(DCB, IPS etc.)



- ✓ The goal is to connect legacy payment technology effectively to Payto protocol.



PAYTO: Web Payment Service Architecture Design

✓ W3C's Web Payment Specifications

Payto

Web Payment standards that the sender is the subject of the payment
It is a simple solution which users to make a payment with web link.

Signing HTTP Messages

Enables a Web client or server to authenticate and authorize the HTTP message by using HTTP protocol

OAuth Authentication

The method which client authenticates through the resource server without disclosing private details to 3rd party applications.

Price Index

The currency exchange automation scheme that allows the customer and merchants to make a payment and receive money with their preferred currency

Payment Intent

Displays a set of payment instruments when the sender is about to make a payment

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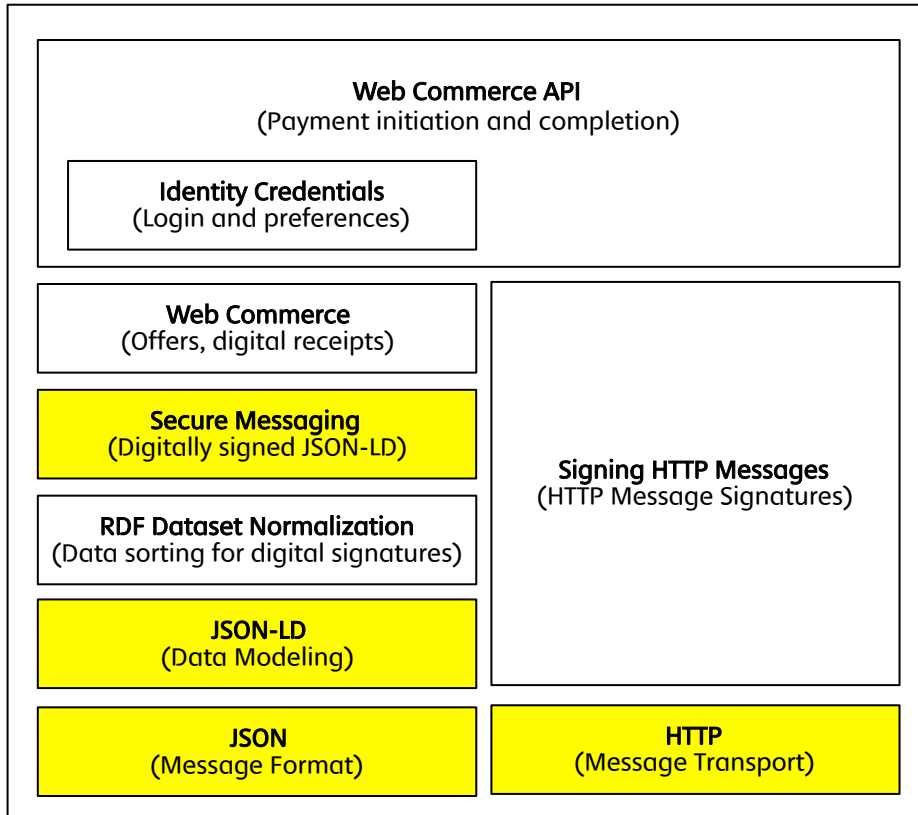
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✓ W3C Specifications

W3C CG's Specifications



Graft Specifications

Secure Messaging (Digitally signed JSON-LD)

Secure Messaging uses public key cryptography which allows web application to verify a client and messages are signed by digital signature to ensure that the content of the messages have not been compromised.

HTTP (Message Transport)

The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypertext information systems. HTTP functions as a request-response protocol in the client-server.

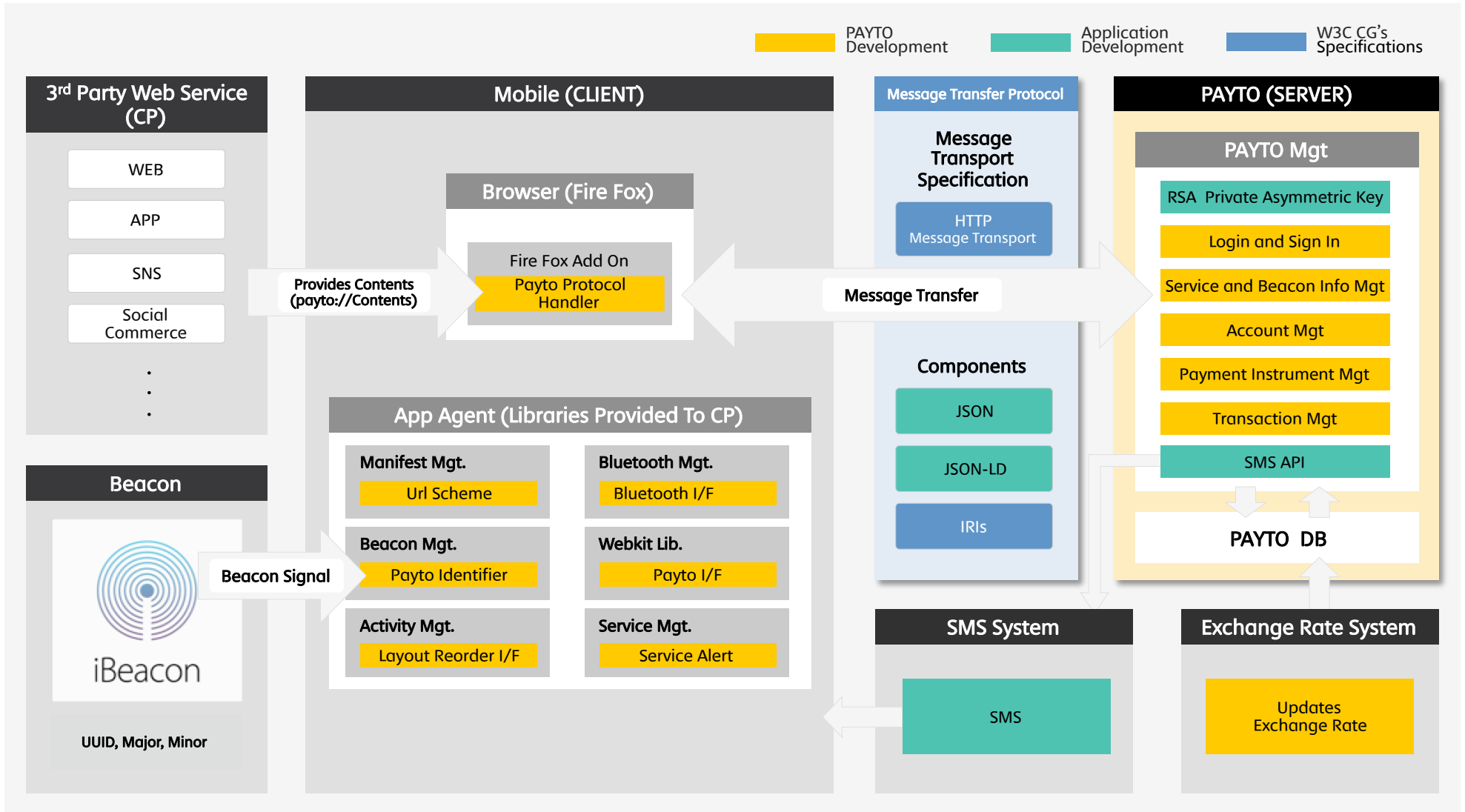
JSON (Message Format)

JSON (JavaScript Object Notation) is a lightweight data-interchange format. It consists of strings, numbers, booleans and null and objects and arrays.

JSON-LD (Data Modeling)

JSON-LD is a syntax which is a JSON-based format to serialize Linked Data. It allows identify Linked Data by an IRI (Internationalized Resource Indicator) on the web.

✓ Payto Target System Configuration



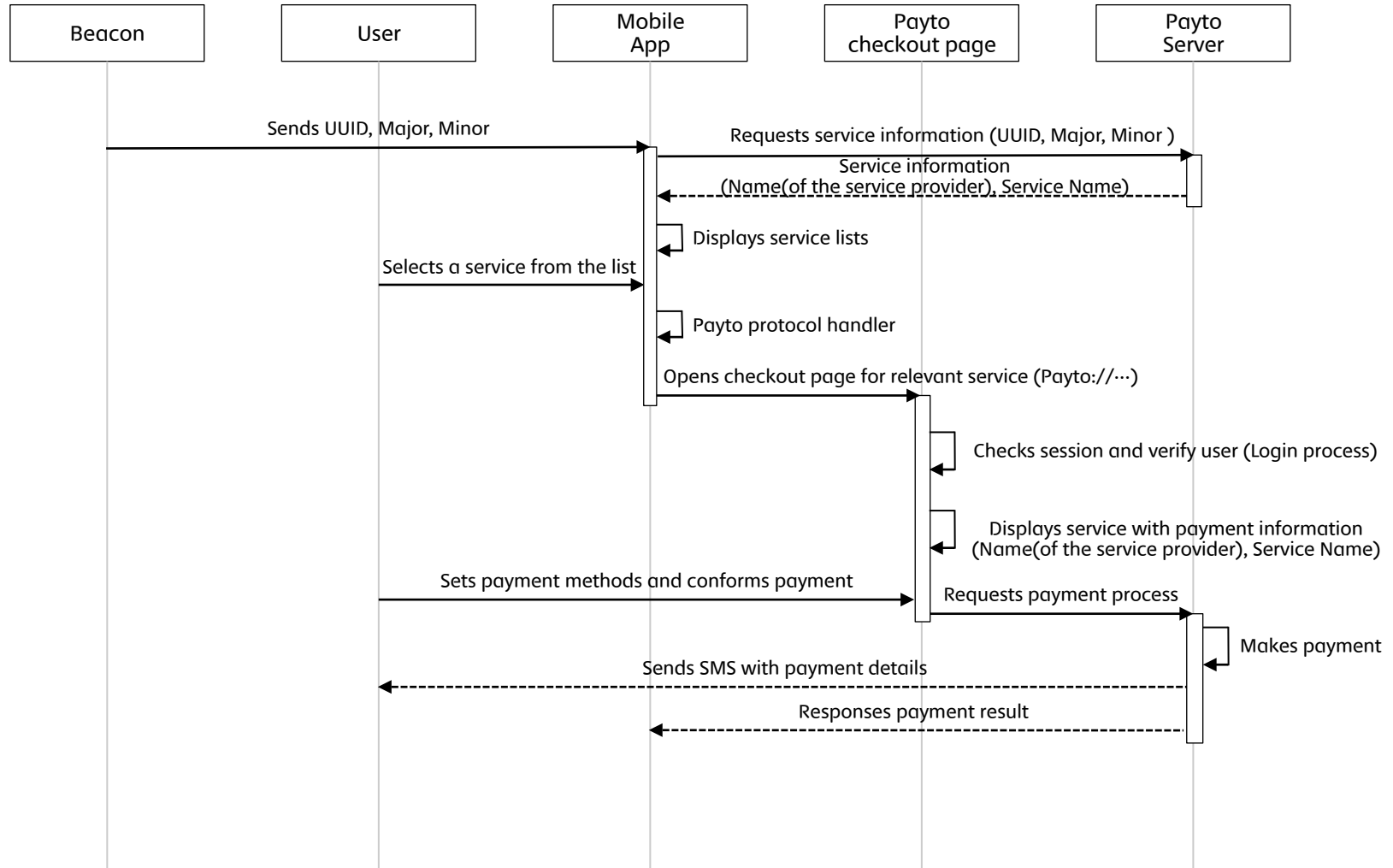
✓ Payto Solution Specifications

Category	Function(division)	Function(section)	Function Description
Mobile (CLIENT)			
Browser	Fire Fox Add On	Payto Protocol Handler	An Add-on solution, which enables Payto protocol in the browser.
	Scheme	Send List App Scheme	A scheme for the mobile browser to call an app.
		Send Receipt App Scheme	A scheme for the mobile browser to call an app with settlement information.
	RSA, Message encryption		The Message sends to server with RSA encryption.
App Agent (Libraries Provided To CP)	Manifest Mgt.	Url Scheme -Payto://	A scheme to open Payto checkout page.
		Url Scheme - Sendlistapp://	A scheme to go to app's service list.
		Url Scheme -sendreceiptapp ://	A scheme to go to a payment confirmation page.
	Beacon Mgt.	Payto Identifier	Enables a app to detect beacon signal.
		Payto Identifier	Requests for the service from the Payto server that is relevant to the beacons UUID.
	Bluetooth Mgt.	Bluetooth I/F	A function which checks the Bluetooth status
	Webkit Lib.	Payto I/F	A function which opens Payto checkout page (the browser) from the app.
	Activity Mgt.		Manages smartphone's task layer.
	Service Mgt.	Service Alert	Alerts smartphone when the beacon signal has detected.
		JSON Parser	Parses JSON objects from the server and displays services to the screen.

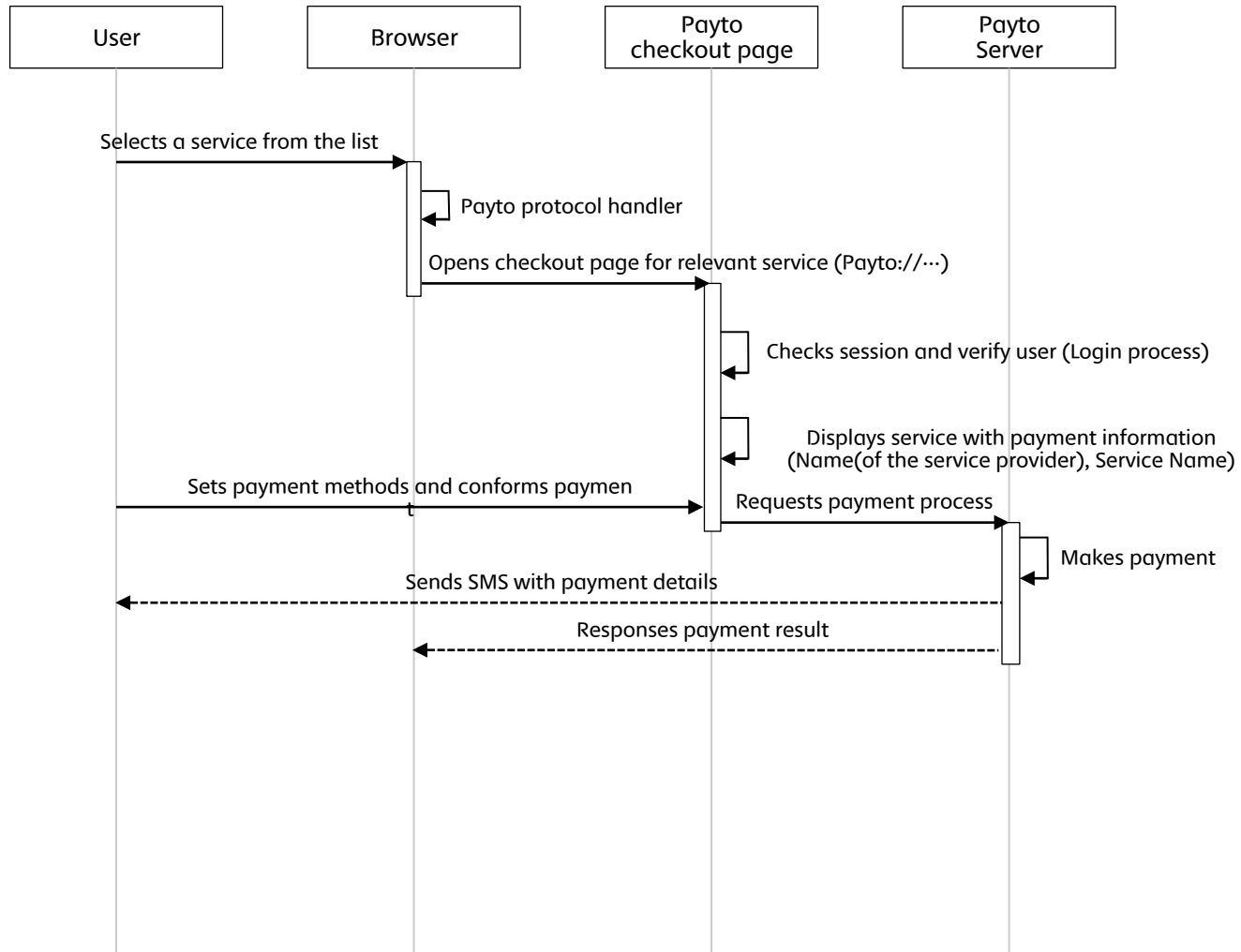
✓ Solution Specifications

Category	Function(division)	Function(section)	Function Description
PAYTO (SERVER)			
Payto Mgt.	RSA asymmetric key generation and decryption.		A function which generates asymmetric keys and decrypts received message.
	Login and sign in		Manages and registers the user to the date base.
	Service/Beacon management		Manages and registers the service and the beacon information to the data base.
	Financial account management		Manages and registers the financial account to the date base.
	Payment instrument management		Manages and registers the payment instrument to the date base.
	Transaction management		A function to look up a transaction record for the date base.
	SMS API		An API which sends SMS to the user's registered mobile number when the payment has made.
	Service look up		A function to look up the service related to the beacon when the mobile app has made the request.
Message Transfer Protocol			
HTTP Message Transport			A protocol for the message transfer.
Message	JSON		The service consists of JSON object.
	IRIs		IRI which can contain Unicode to the URL.
	JSON-LD		JSON-LD links the JSON object with the IRI.
SMS System			
SMS			Sends SMS to user's mobile phone.
Exchange Rate System			
Updates Exchange Rate			Updates exchange rate from http://krw.kr.fxexchangerate.com/rss.xml and stores to DB/1 hour period

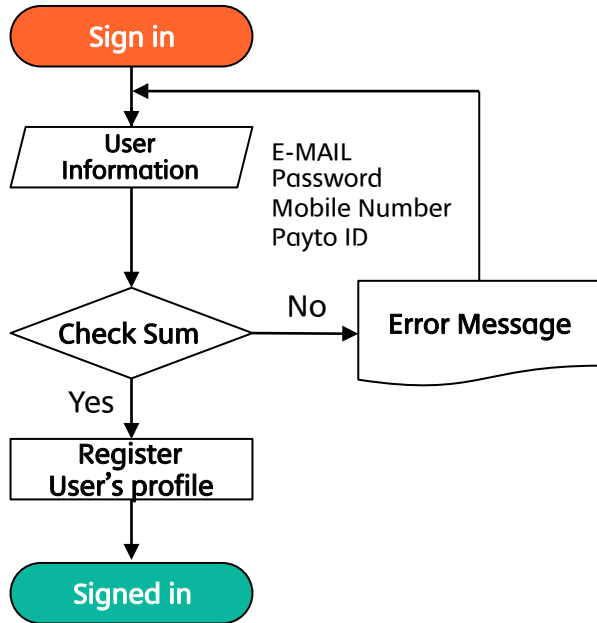
Offline Payment Using Beacon (Payto Background Service)



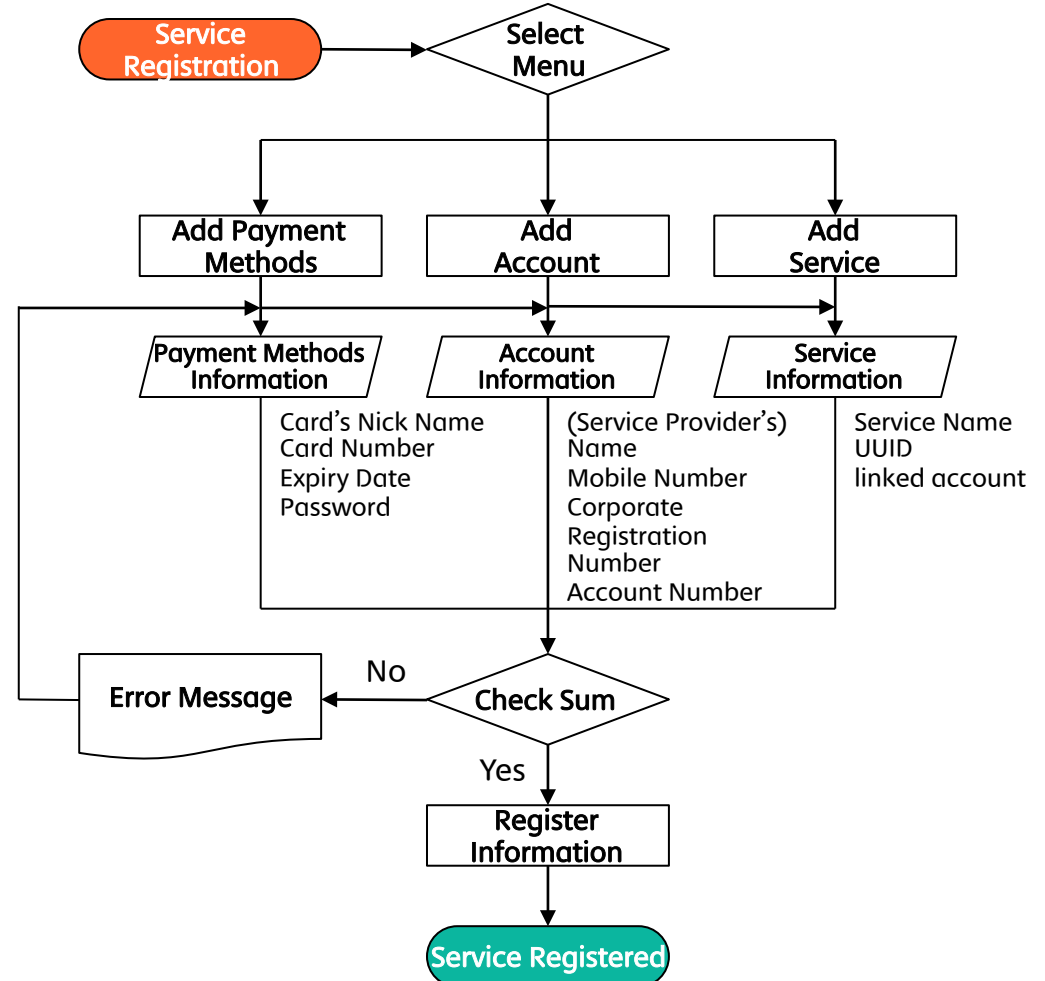
✔ Online Payment (Payto Add-On Solution)



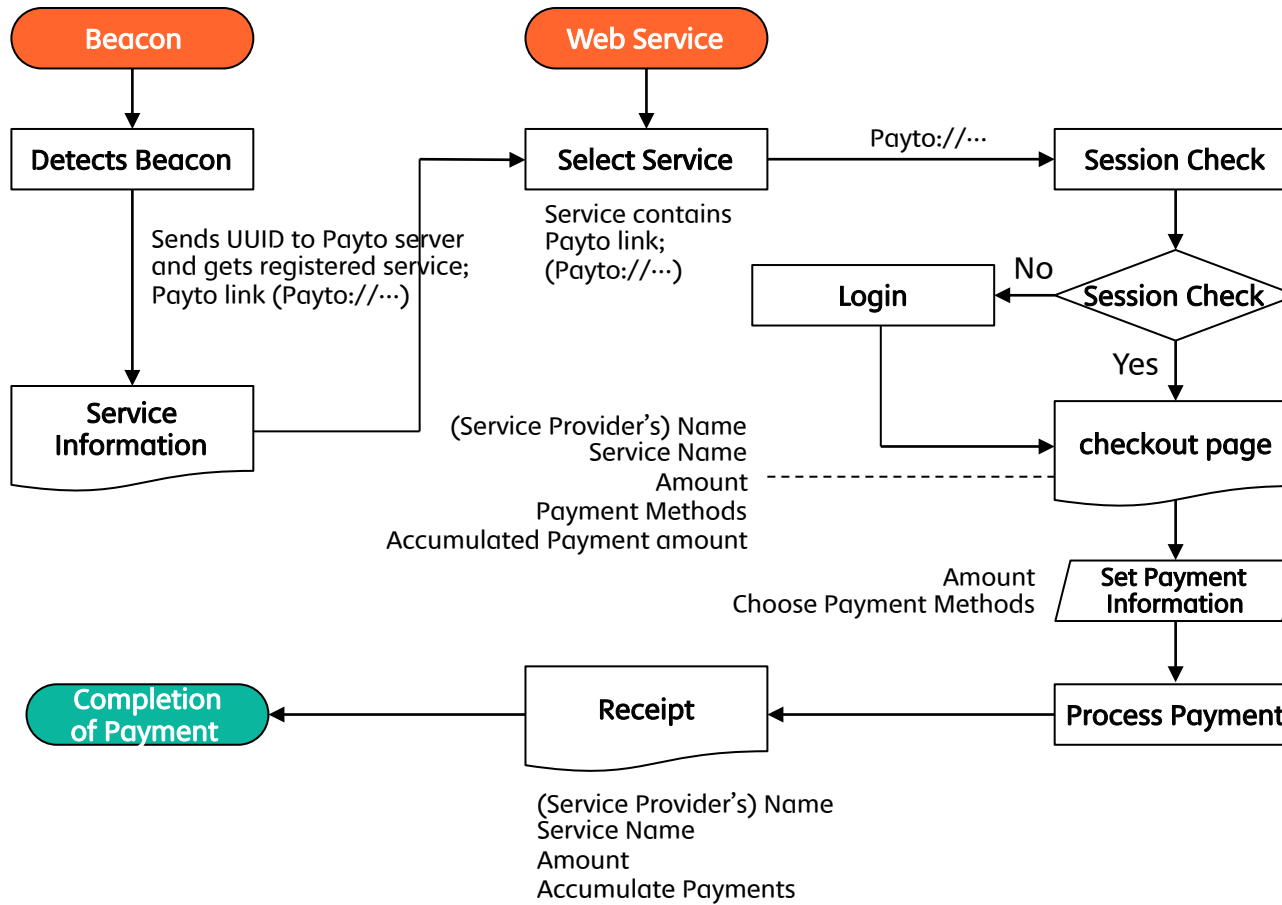
✓ Sign In



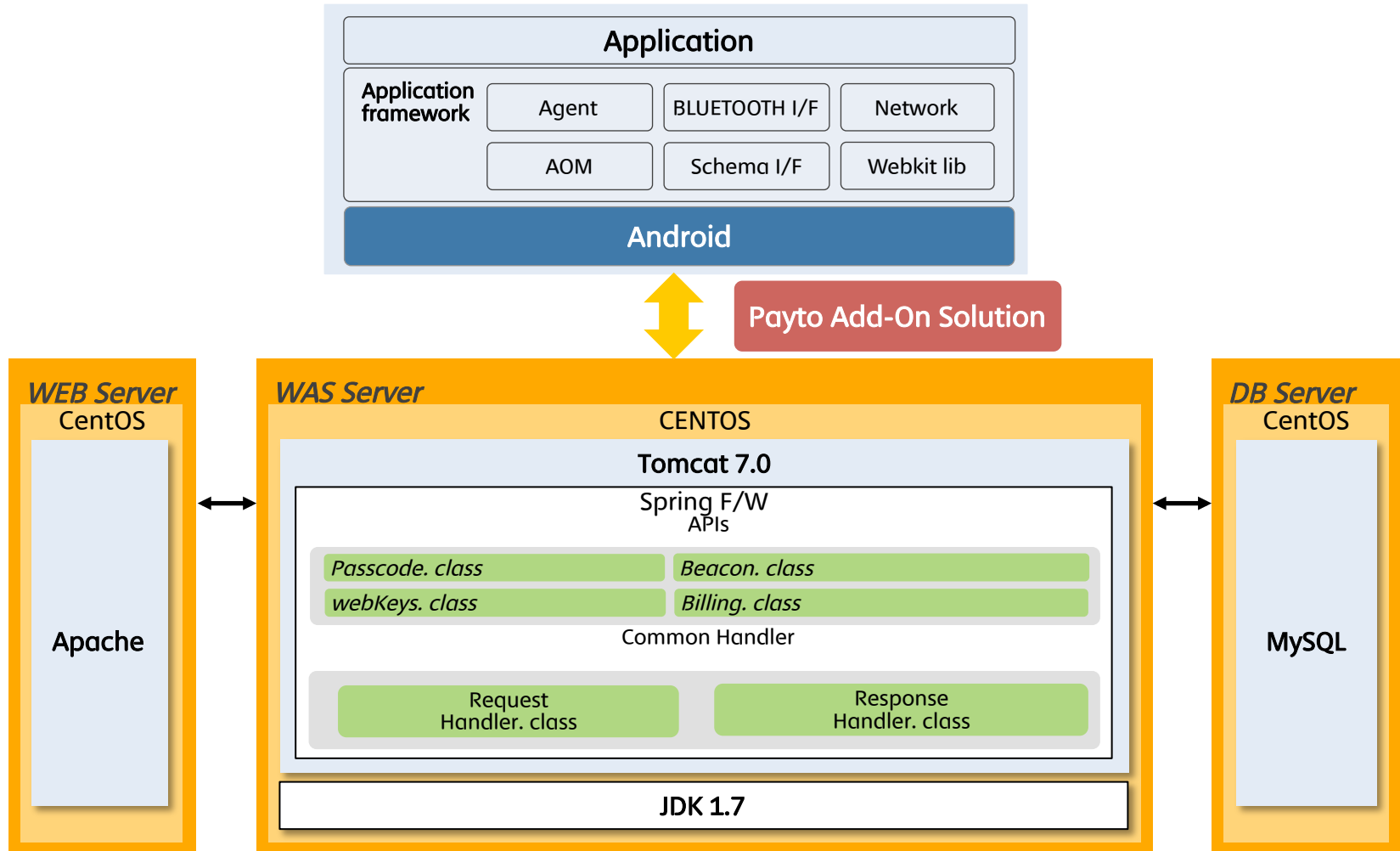
✓ Service Registration



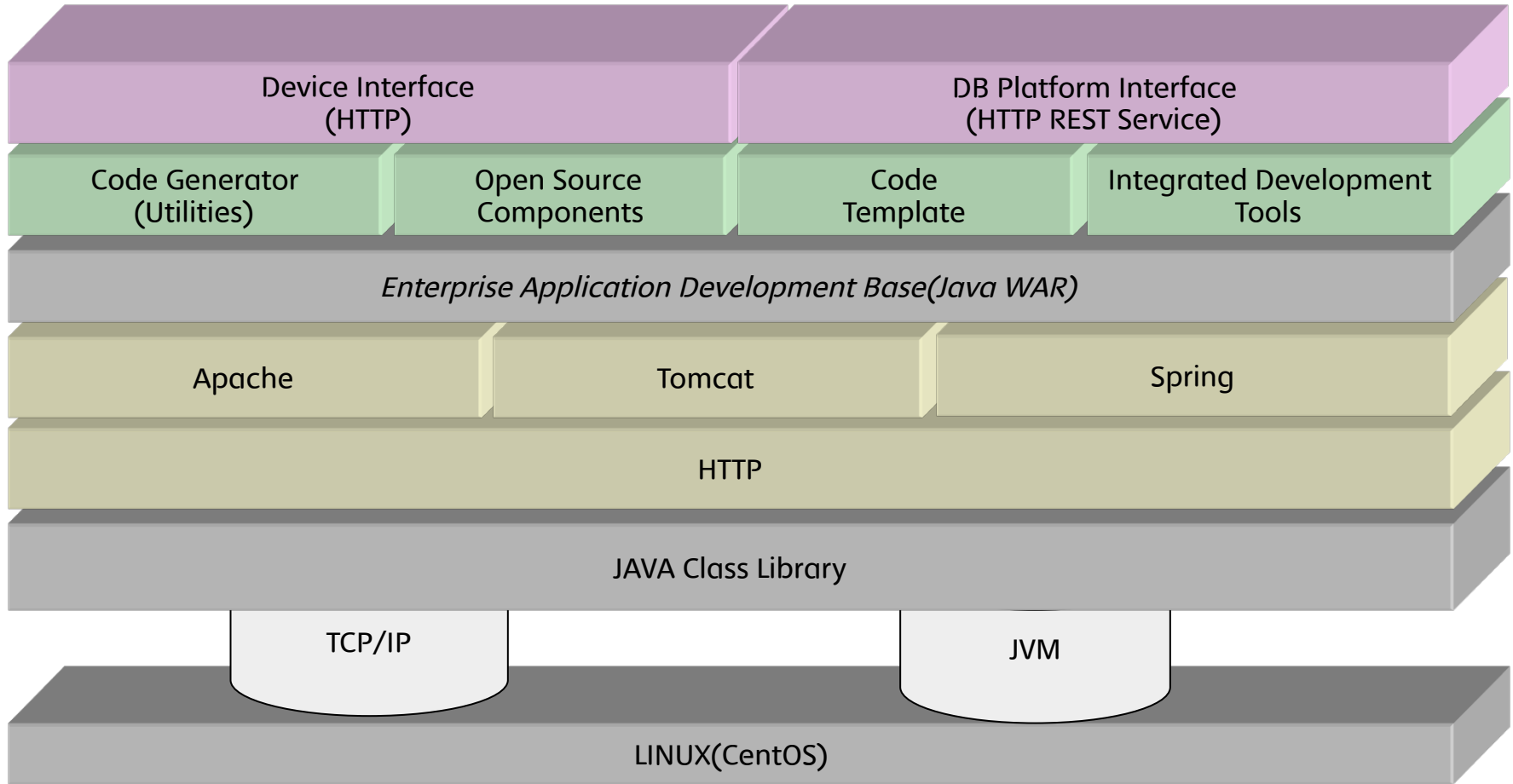
✓ Payment Flow



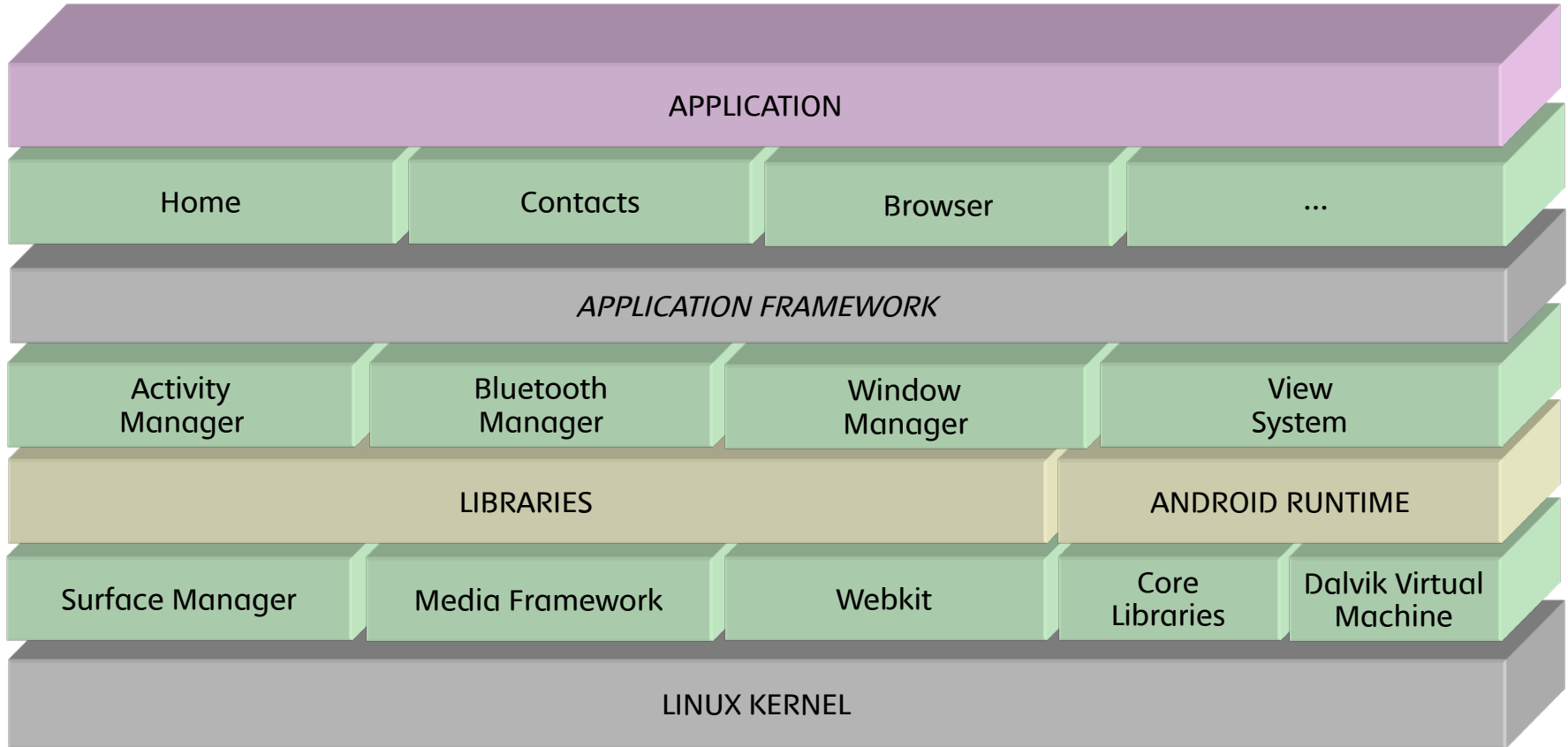
✔ SKT's Web Payment S/W Configuration



☑ SKT's Web Payment Framework Configuration(Server)



☑ SKT's Web Payment Framework Configuration. (Android)



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