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FUJITSU Cloud Service K5 API Management Service Functional Overview

March 2018

Fujitsu Limited

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About Web API

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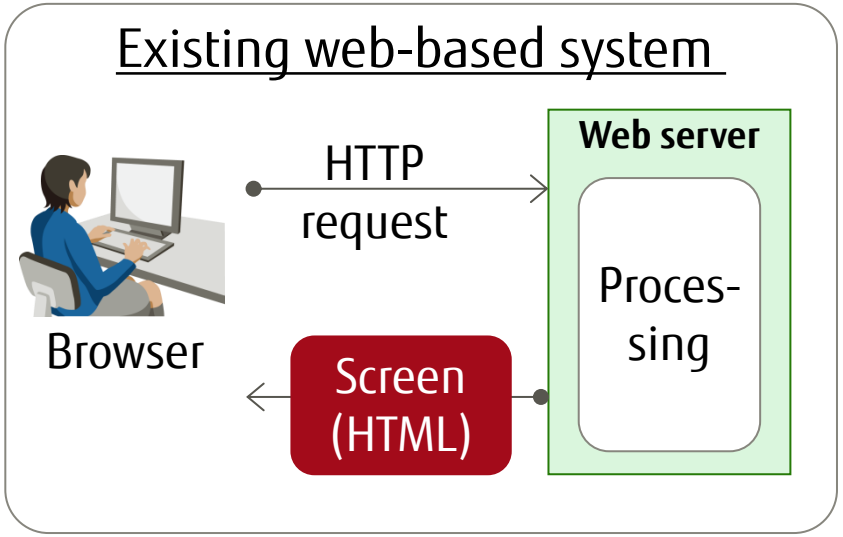
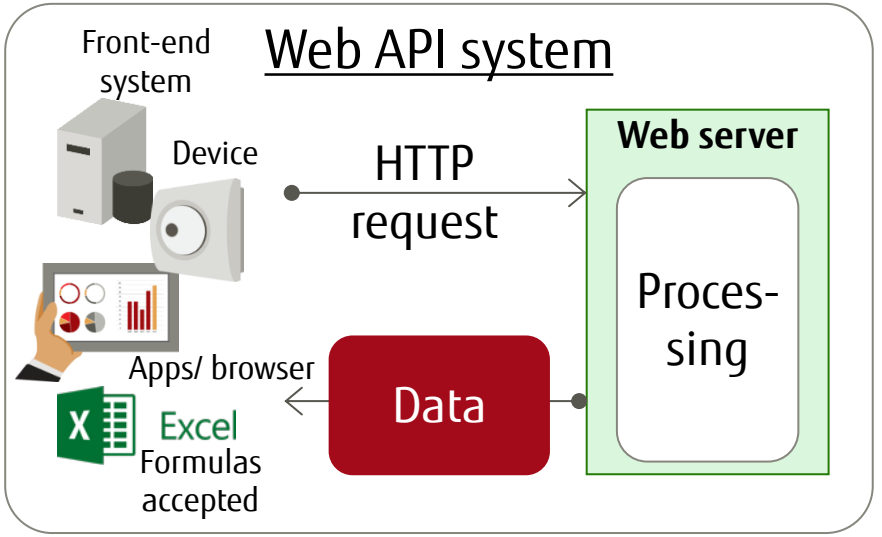
- Web API enables IT engineers to access various kinds of services through programing code
  - API users can access various functionality by aggregating many kinds of APIs. Engineers are starting to customize applications themselves or create new applications using APIs.
- Differences from existing web-based systems
  - Existing web-based systems provide data and functions via a screen (HTML-based).
  - The Web API only exchanges data. The client side is not necessarily a browser. (Any HTTP compatible format can be used)





Major Web API Usage Scenarios

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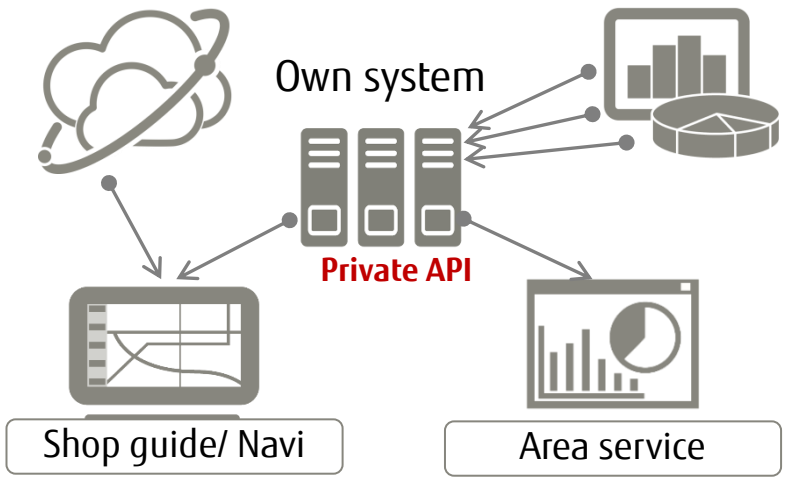
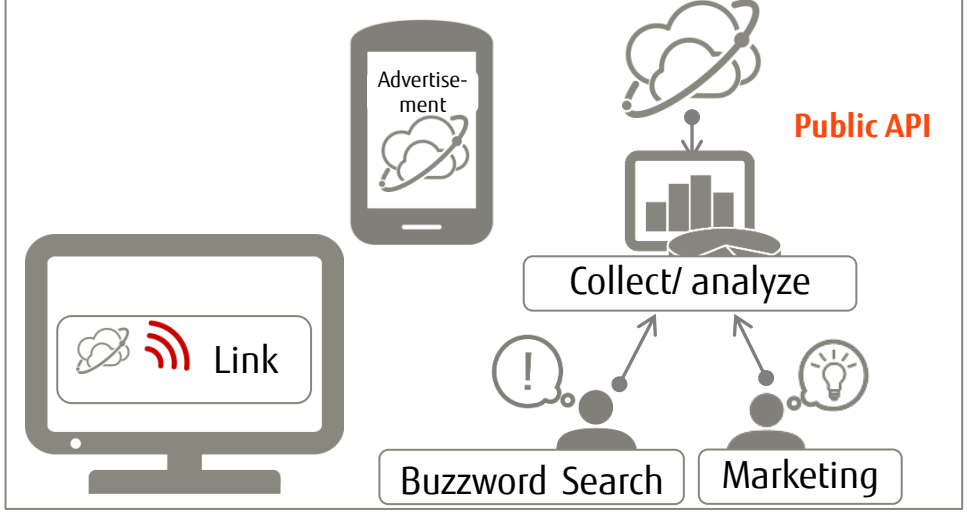
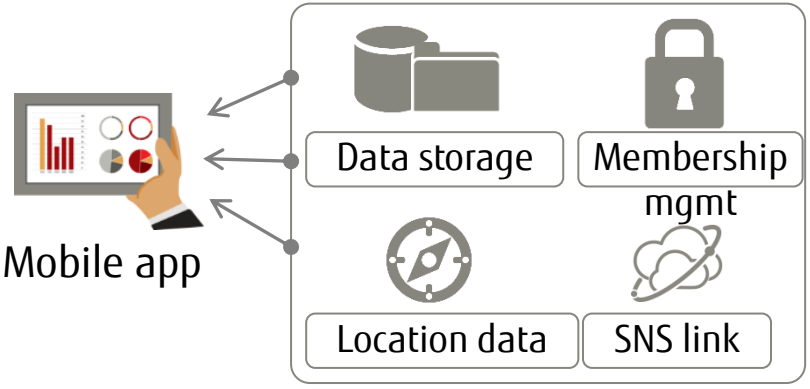
Service mash-up



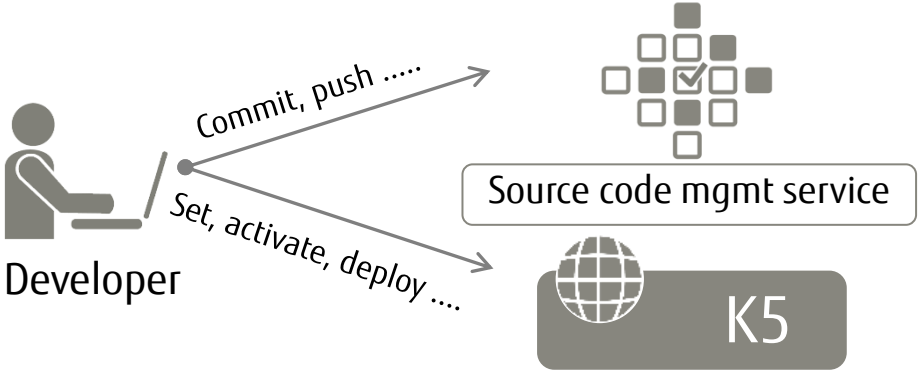
Community-wide usage



Mobile back-end (MBaaS)

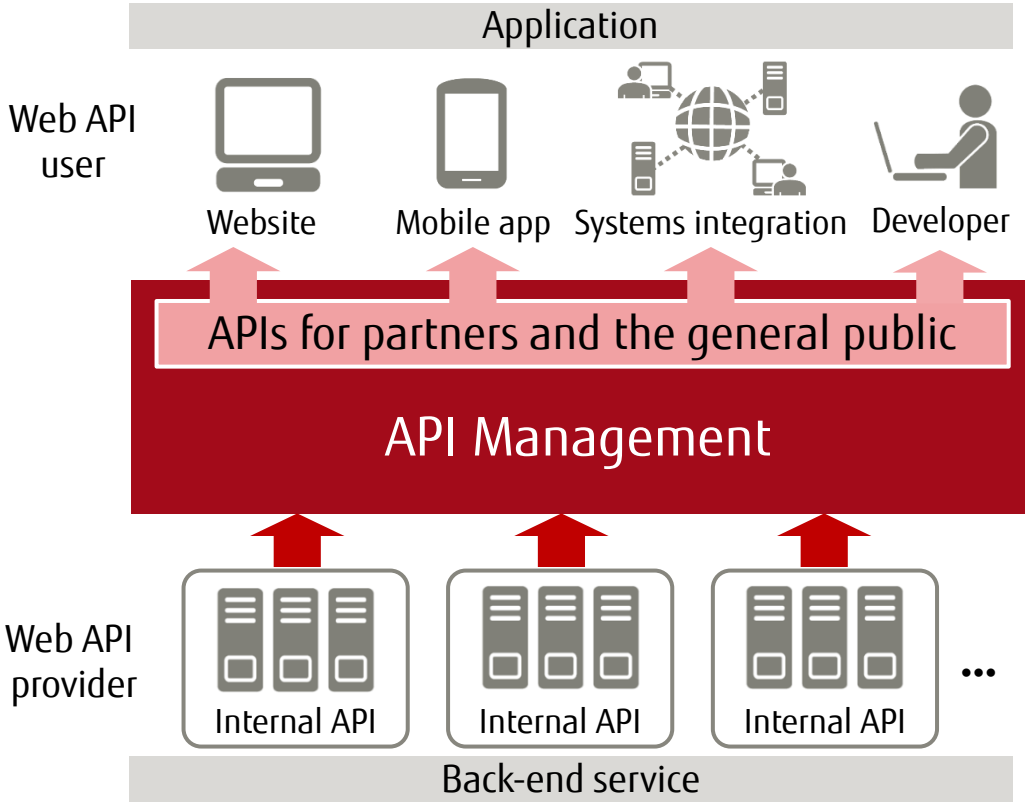


Cloud platform/ development environment



Service Overview

K5 API Management provides valuable functionality such as API development, publishing, enhancement and operation. K5 API Management will continuously contribute to your business.



API PROXY

Safe access

- Authorization
- Security checking
- Traffic control

Improved convenience

- Request/ response editor
- Service mashup
- Cache
- API programmability
- API version management

Monitoring & reporting

- Monitoring of API traffic
- Dashboard display
- Customized reporting

Offerred by FUJITSU Cloud Service K5

API Management Features

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- Functions provided by the API Management service
  - Shared functions/ Private API functions
  - Public API functions

Compatibility/ connection	Optimization	Security	API development
• Extract data from messages • Convert XSL • Convert SOAP to REST • Edit requests • Edit responses	• Response cache • Key value store • Limit the number of concurrent connections • Prevent traffic spikes • Limit traffic volume	• OAuth 2.0 • Basic authentication • SAML support • LDAP link	• Add-on programs • Development/ operation environment • Non-stop deployment • Multi-version management • Policy/ flow editor • Monitoring (API performance, errors)

Shared functions
Functions for Private API

Publishing	Analytics
• Package APIs • Set ACL (update/ reference) • Limit traffic volume • Assign key (API keys)	• Statistics for the operations administrator • API developer usage statistics • Application statistics • Business statistics • Report customization

Functions for Public API

Functions for Publishing APIs

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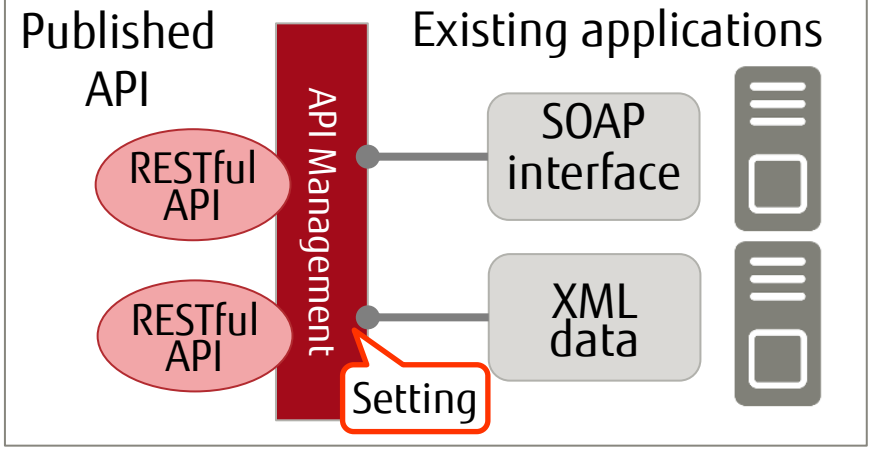
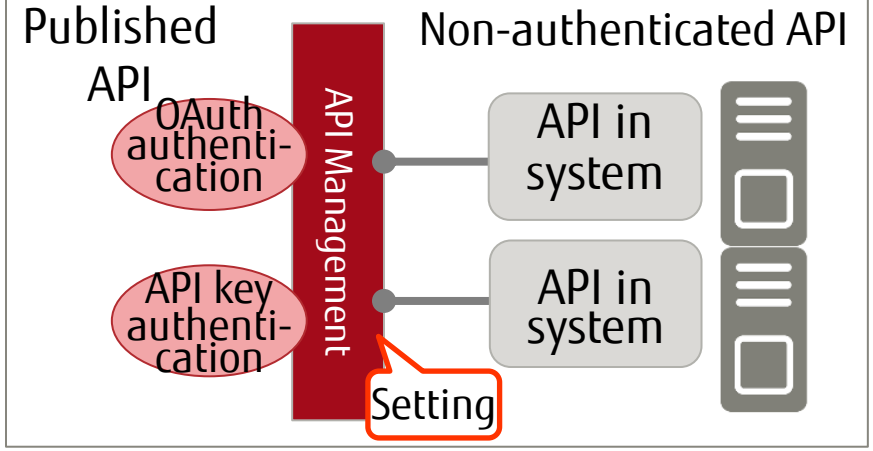
- Functions are offered to simplify the publishing of APIs

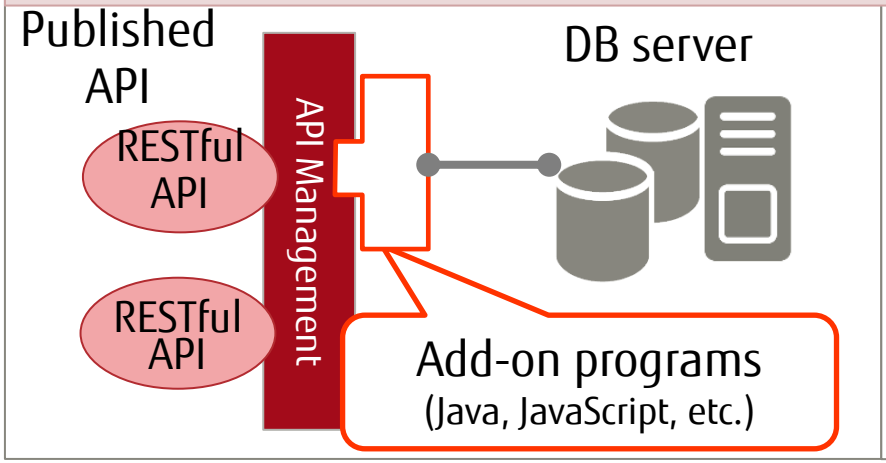
Convert protocol/ data format

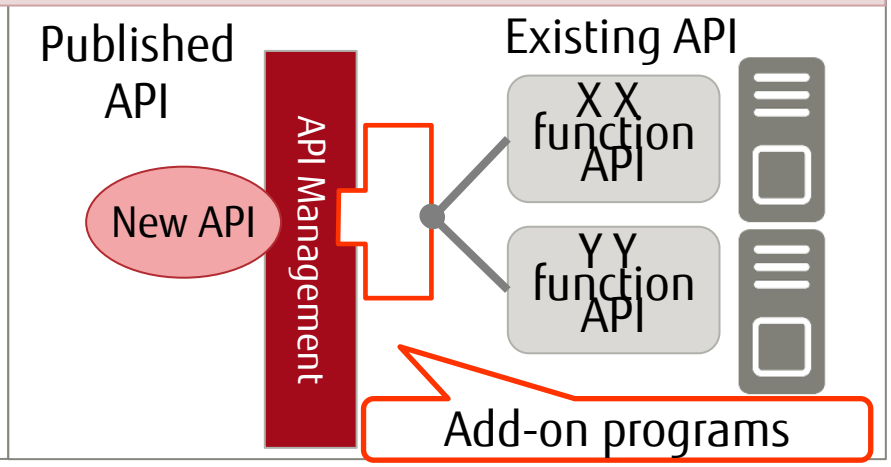


Add authentication functions



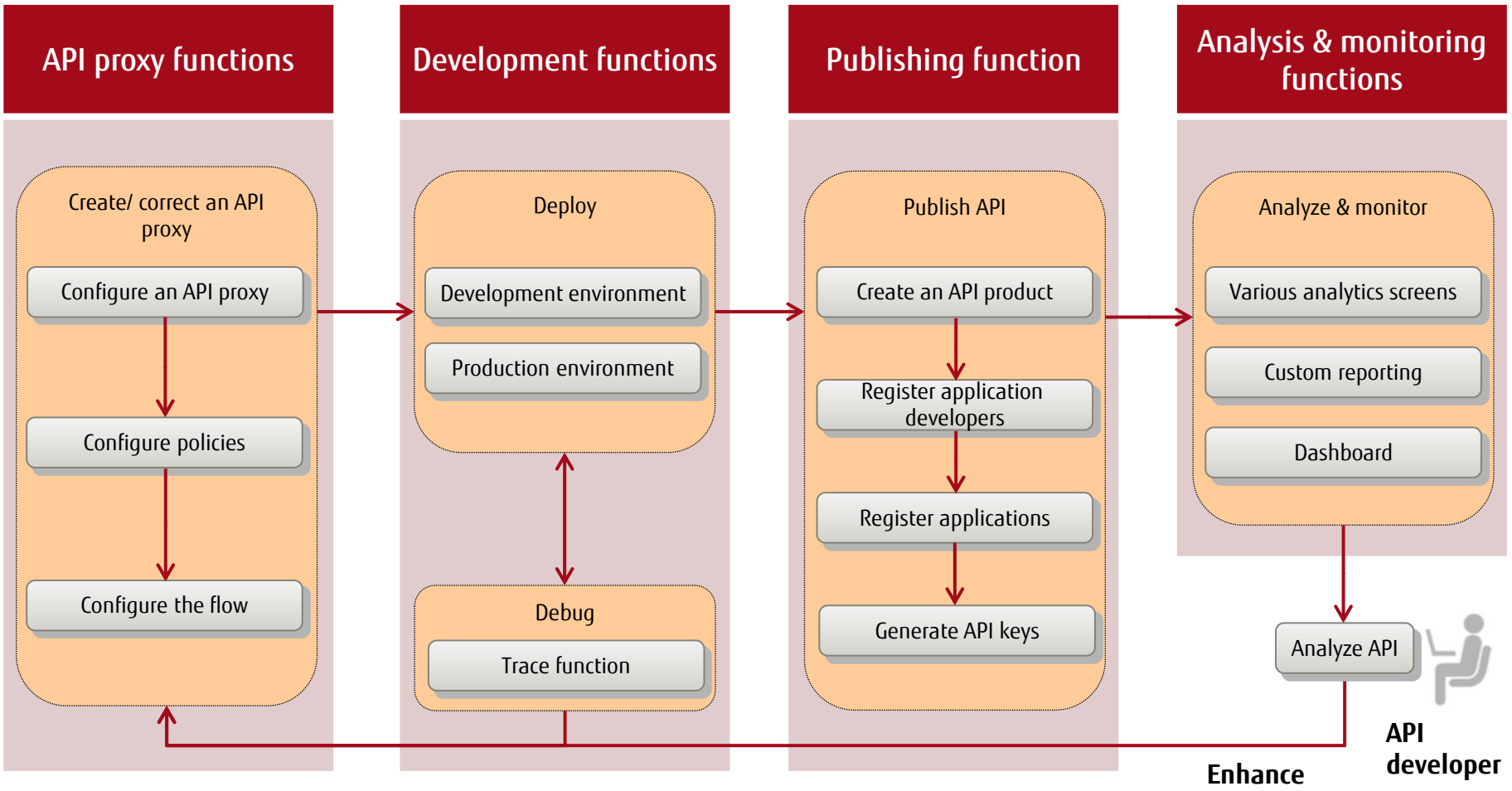
Publish APIs without an AP server/ mash-up of existing APIs





API Development Flow

The following chart shows the process flow for developing an API using the API Management service



API Proxy Functions

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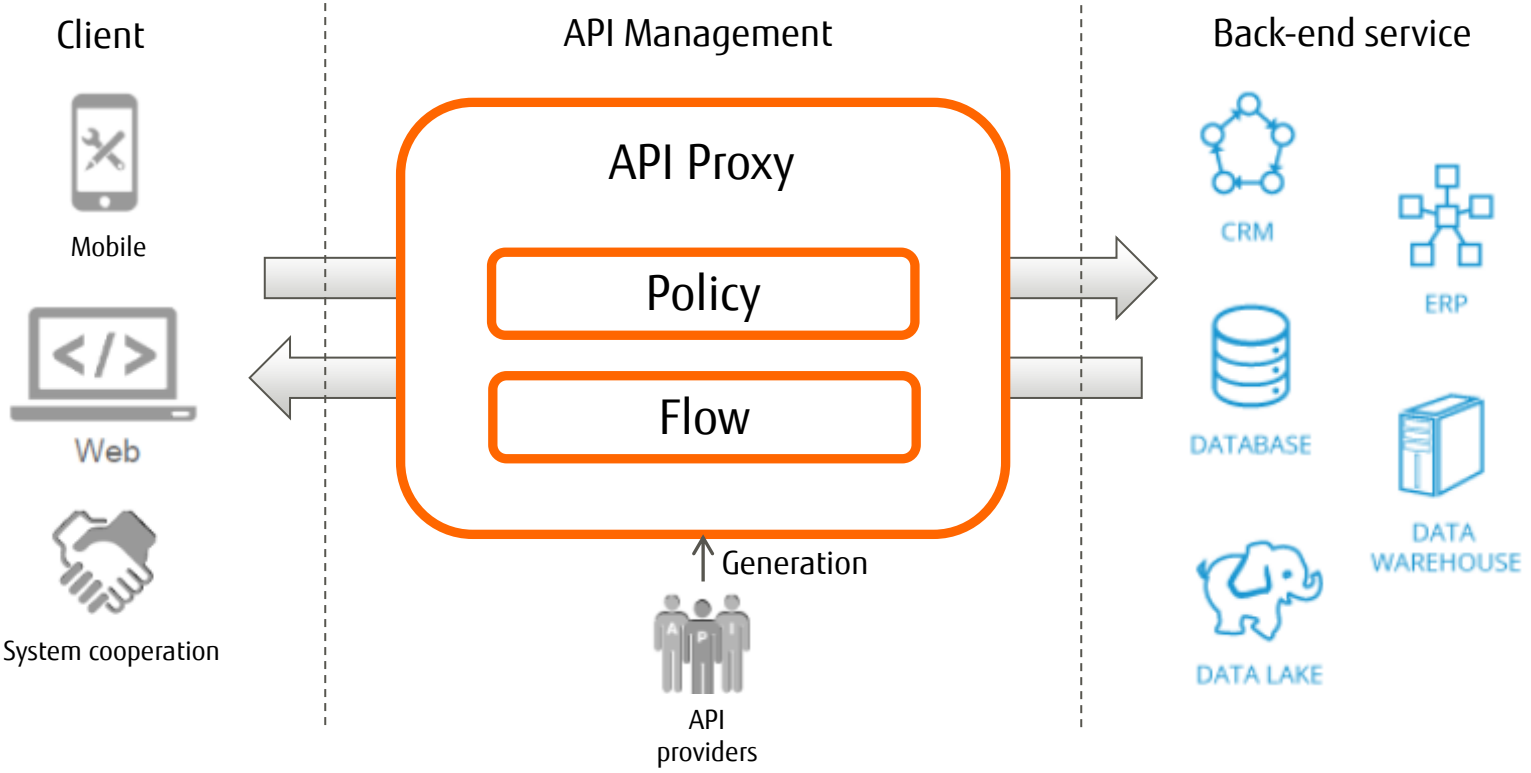
The API Proxy is a core component of API Management and acts as a gateway. The API provider can flexibly edit the API request and response without writing any code.

- ✓ Policy (add various kinds of features to the back-end service)
- ✓ Flow (control the processing sequence of the attached policy)



API Proxy Function – Policy

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The Policy is easily attached to your API.
This significantly reduces the amount of coding required.

Reduce Time to market

More than 30 functions can be added through configuration only, without any coding

- Authentication/ security
- Modification of request/ response information
- Caching
- Restriction of traffic volume
- Data format conversion
- Logging

*For all functions, please refer to: 'APIM: Reference: Policy'

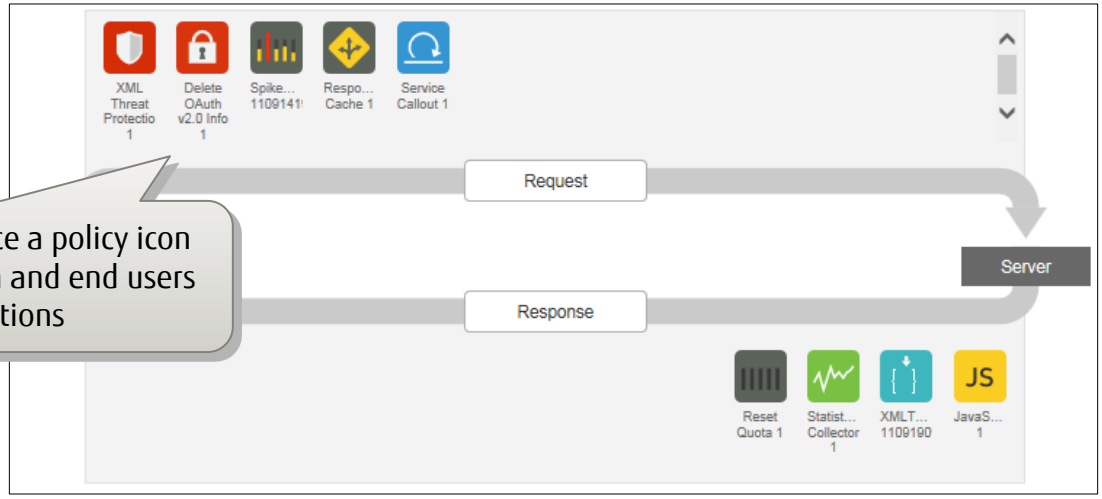
Custom functions can be added using scripts

- JavaScript
- Java
- Python

Back-end services can be implemented on API Proxy

- Node.js

Administrators can place a policy icon on the API proxy screen and end users can use the added functions



API Proxy Function - Flow

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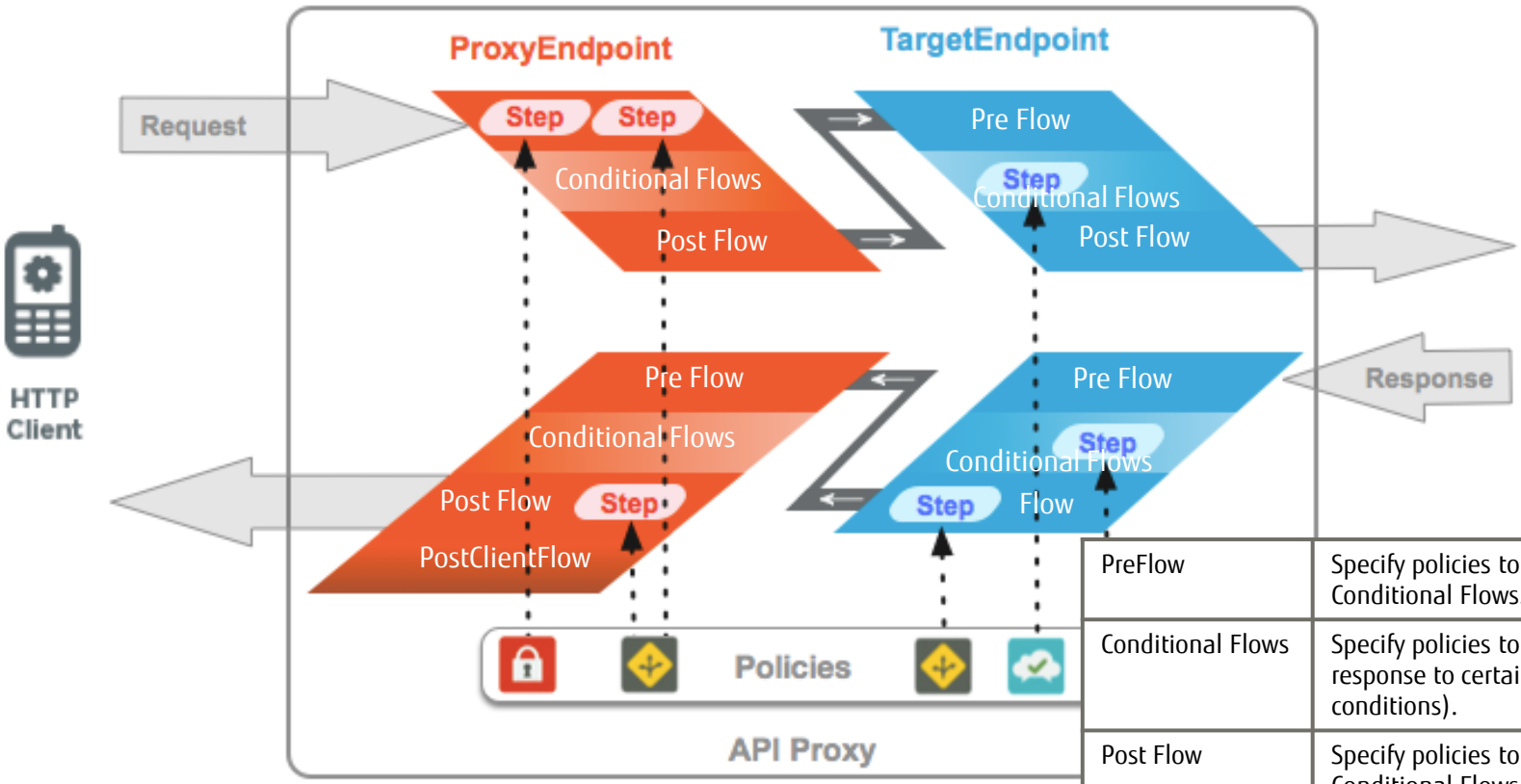
Policies are run at the appropriate time.
The flow defines the policy order and scope for each API.

A Policy is easily attached
Using a GUI-based flow editor



PreFlow	Specify policies to be run prior to Conditional Flows.
Conditional Flows	Specify policies to be run only in response to certain requests (specify conditions).
Post Flow	Specify policies to be run after Conditional Flows.
PostClientFlow	Specify policies to be run after sending a response to the application.

Development Function – Deploy

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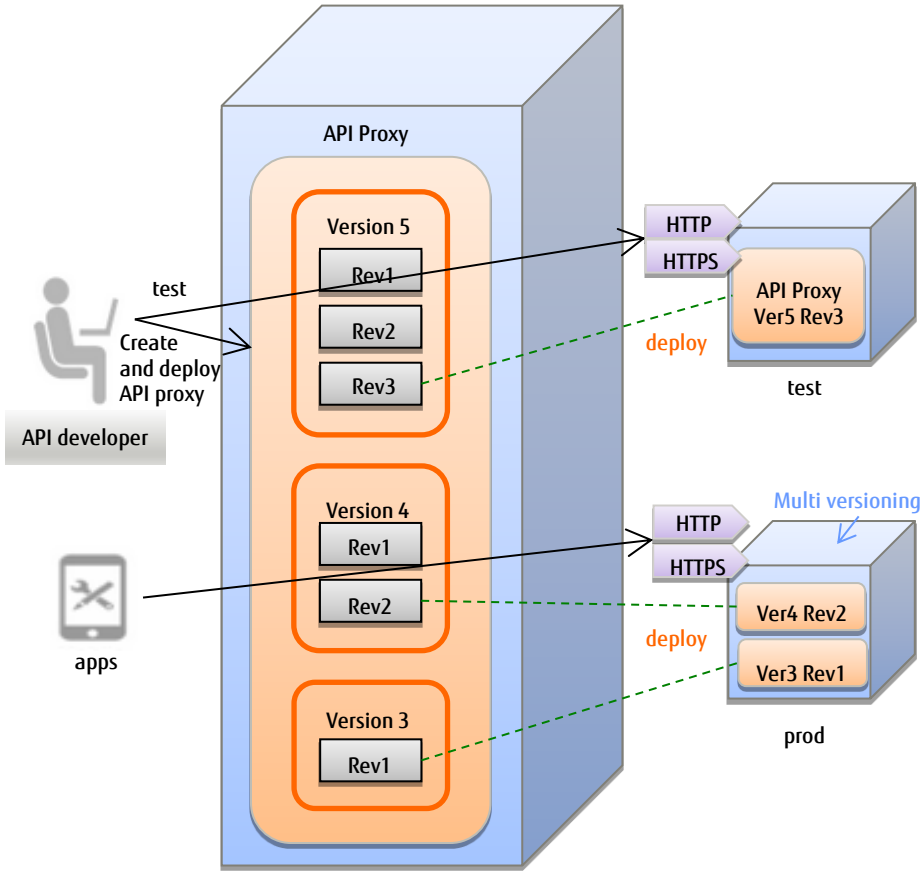
Realize effective API development using the Deploy, Version Management, and Environment functions

Supports agility

Feature	Item	Benefit
Deploy	Seamless	Deploy API Proxy with minimal change to back-end applications
	Multi version Deployment	Support multiple version deployment in the same environment
Version Management	Version	API Proxy manages the lifecycle changes of API policy configurations
	Revision	Revision (smaller unit of a version) support
Environment	Test/ prod environment	Prepare both test and production environments
	HTTP／HTTPS	HTTP/HTTPS are available



Development Function – API Tracer

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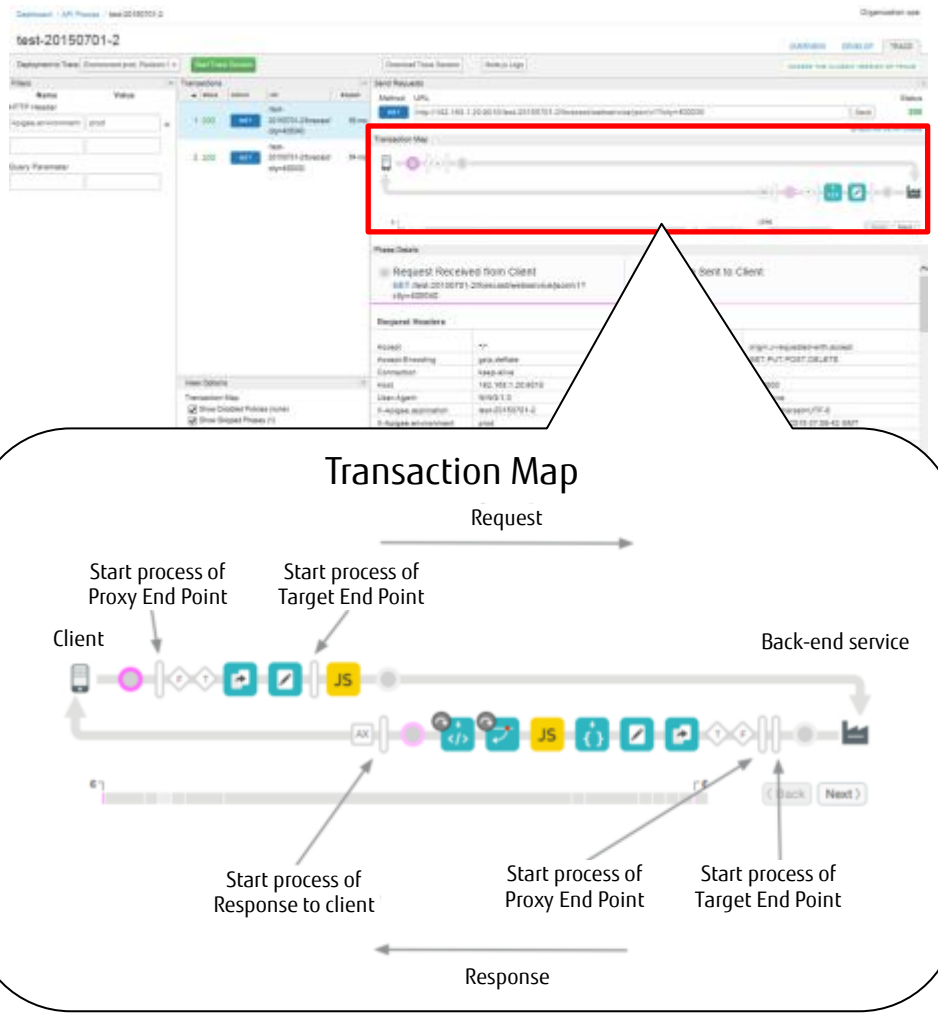
API Tracer enables developers to debug APIs effectively by displaying API proxy transactions and clarifying each policy's result.

Effective troubleshooting



Transaction Map

- Displays each step of a transaction using icons.
- Details are displayed by clicking an icon.
- The masking function hides confidential information when icon details are displayed.
- End users can trace transactions using tools such as a browser, curl, etc.

Filter

- Transactions can be filtered in the trace with the following conditions.
  - ✓ HTTP header
  - ✓ Query parameter

Offline Trace

- Results of a trace can be exported and imported via the online trace screen.

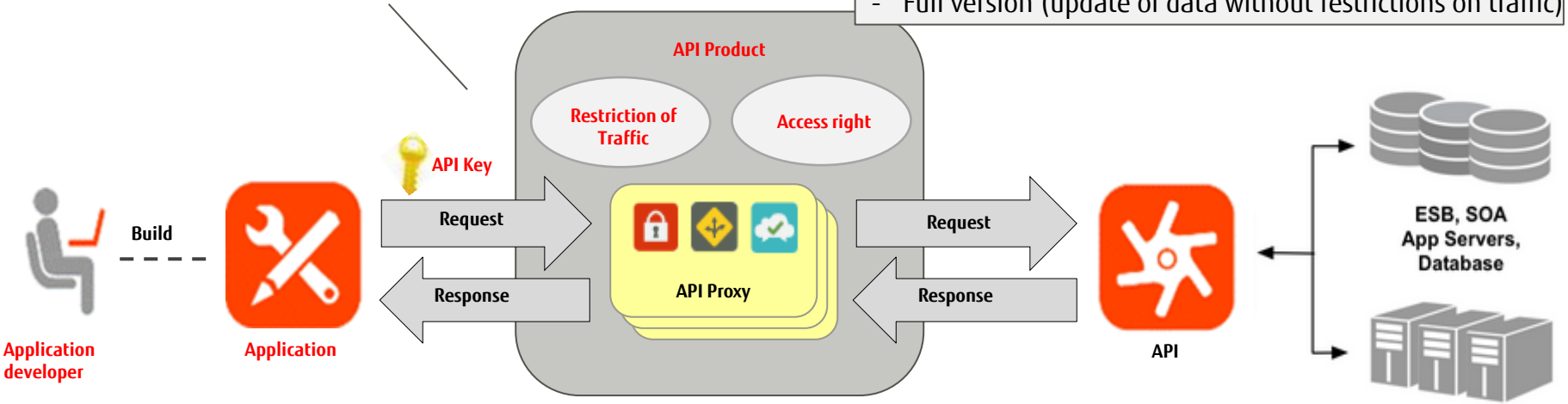
Publish Function

This function is used to publish the created APIs (API Proxy) to the application developers. It can publish packaged API Proxy as a product based on usage by configuring access rights and traffic restrictions.

Supports flexible product offerings which meet business demands

The API keys required to run an API are provided when application developers, applications and the products to be used are registered.

Example of Products
- Free version (refer to data with restrictions on traffic)
- Lite version (update of data with restrictions on traffic)
- Full version (update of data without restrictions on traffic)



(*)Scope of management by the Publish function is shown in Red

Analytics & Monitoring Function – Analytics

The Analytics service enables effective operation and boosts business using various kinds of real time reports.

- API traffic
- Real time monitoring
- Performance

Example of Collection of API Traffic

Analytics Screen

End users can monitor the information collected via the following 9 screens:

- Proxy Performance
- Target Performance
- Cache Performance
- Latency Analytics
- Error Analytics
- Developer Engagement
- Traffic Composition
- Business Transactions
- Devices

* For details of each screen, please refer to:
'APIM: Reference: Analytics List'

Analytics & Monitoring Function – Custom Report

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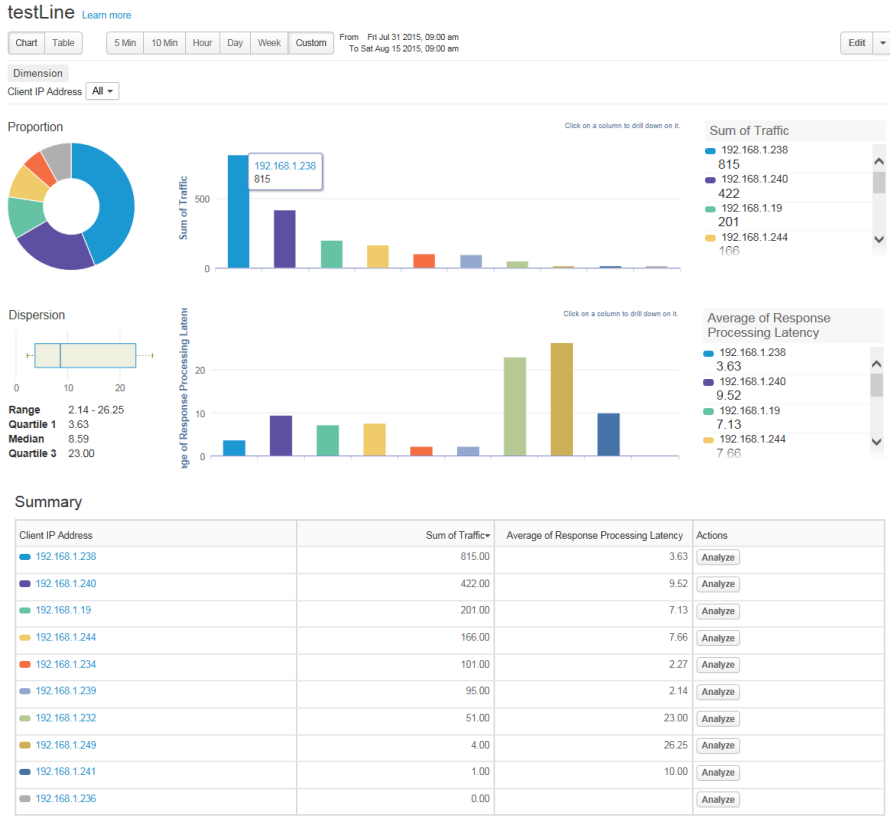
Custom Report enables users to create tailored reports by choosing the horizontal (Dimensions) and vertical (Metrics) axes.

Create your custom report

Custom Report Example



Dimensions

- Users can specify the type of information they want included in traffic reports, such as the IP addresses of clients, OS types, etc.
- End users can select multiple dimensions and then drill down to further analyze the statistical data.

Drill down example
The "OS" and "IP address" dimensions are selected to help analyze the usage of Windows by each IP address.

Metrics

- Users can select information related to API usage such as the number of requests, number of errors, response times, etc.
- The selected items are displayed using charts in the report.

Filter

- Statistical data can be filtered when Dimensions and Metrics are selected.

Analytics & Monitoring Function – Dashboard

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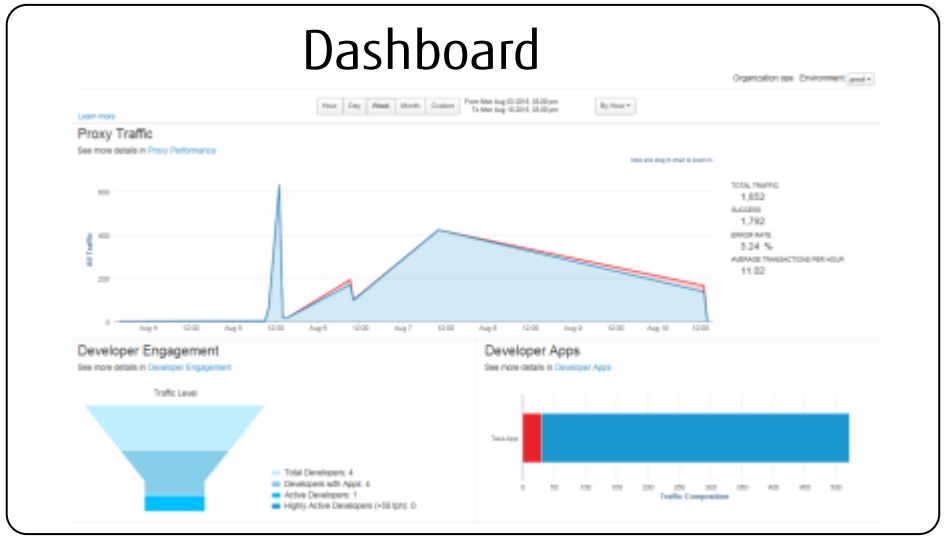
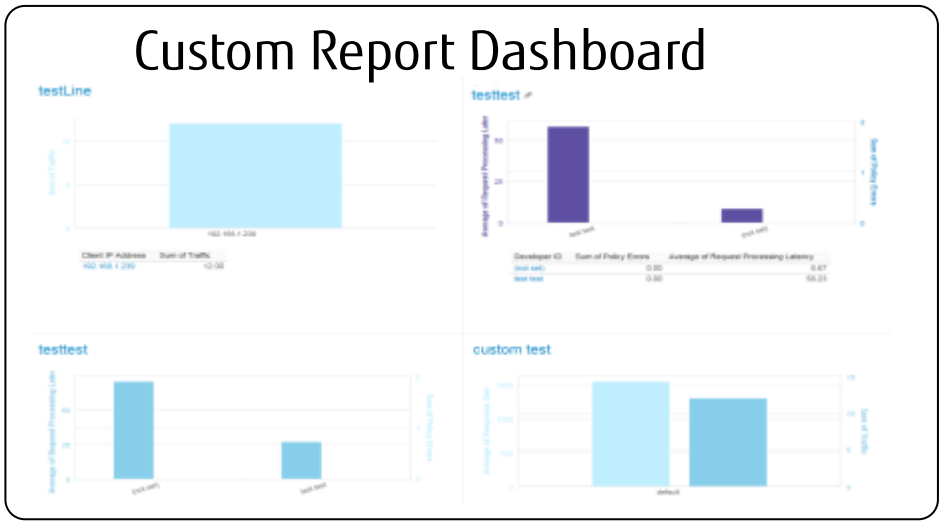
Dashboards provide end-to-end visibility using various metrics.





Description

The following two dashboard options are available:

- Predefined dashboards
  Display all API Proxy traffic information on a single screen.
  E.g. API Proxy traffic, developer usage, app error rates

- Custom Report dashboard
  Four custom reports can be displayed on a single screen.
  Further details are shown by clicking on the chart name.

Analytics & Monitoring Function – Gateway Extension Function (Publishing APIs in Own Domain)

The Customer can use their own domain name rather than the ".paas.cloud.global.fujitsu.com" domain name provided by Fujitsu (so there is no need to change the URL to use the APIs). APIs can be published in the Customer's domain (CNAME must be registered with the DNS server).

Publishing APIs in the Customer's domain and example of use

API Provider

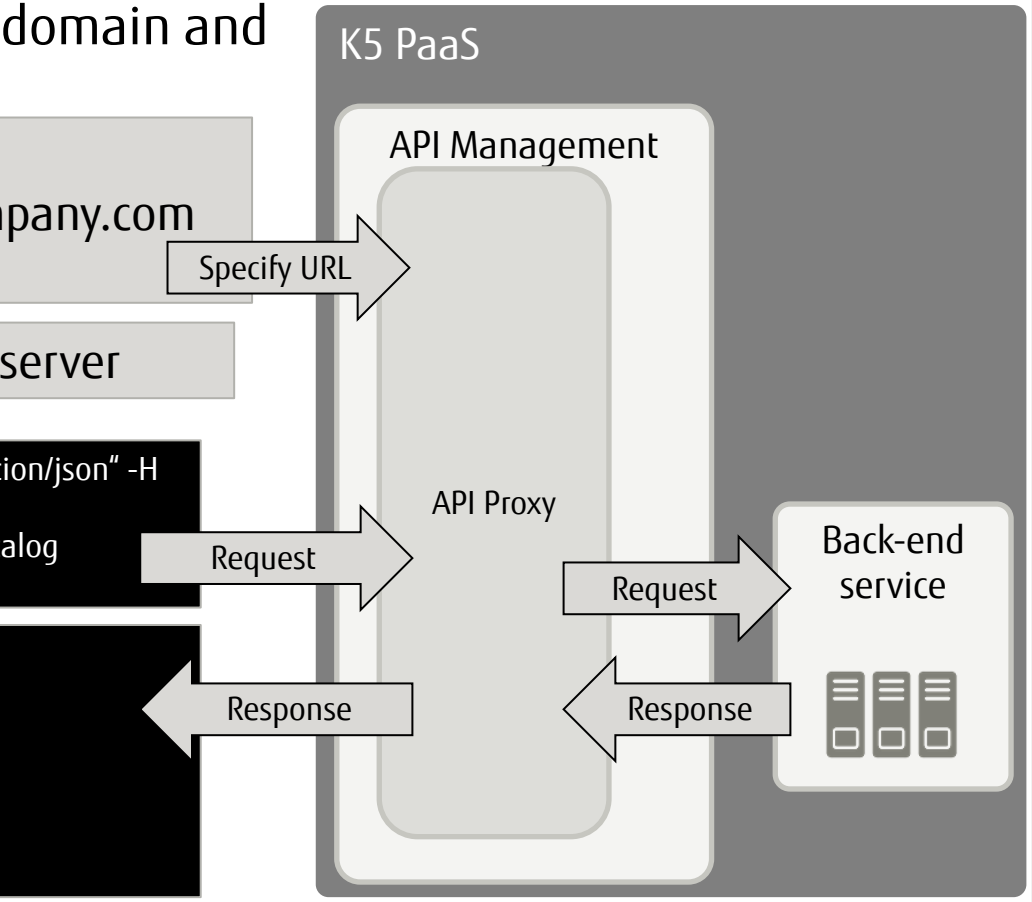
API published as below:
- Domain name: api.mycompany.com
- Port number: 443

Register CNAME with the DNS server

API User

```
$ curl -X GET -H "Content-Type: application/json" -H
"Accept: application/json"
https://api.mycompany.com:443/v1/catalog
```

```
{
 "catalog": [
  ...
 ]
}
```



Analytics & Monitoring Function – Gateway Extension Function (Limit Connections to Published APIs)

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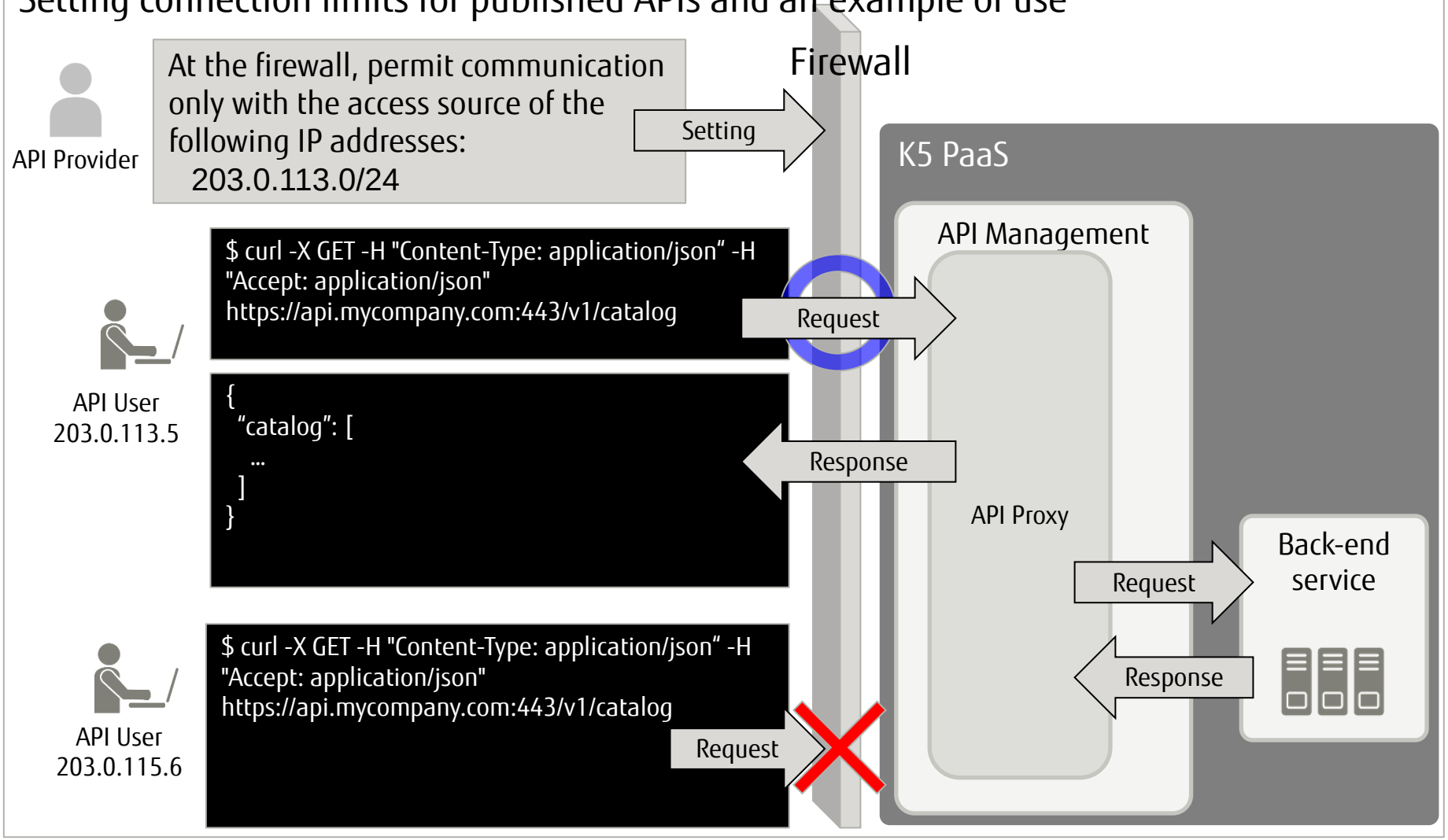
IP addresses that are permitted to access the published APIs can be limited.

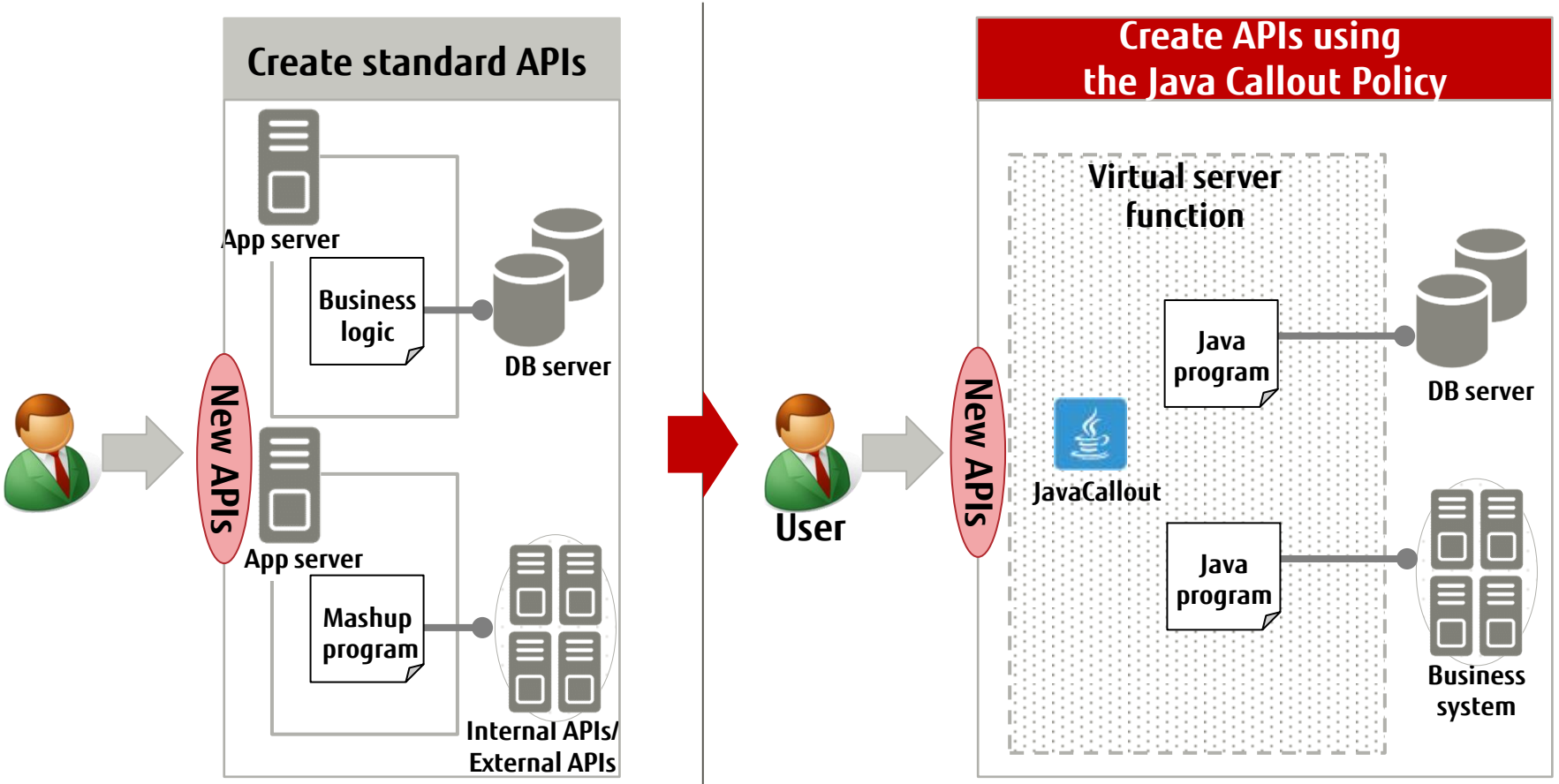
Setting connection limits for published APIs and an example of use



Analytics & Monitoring Function – Gateway Extension Function (Java Function)

The Java programs make links to business systems and DB servers possible. This enables API functions to be extended.

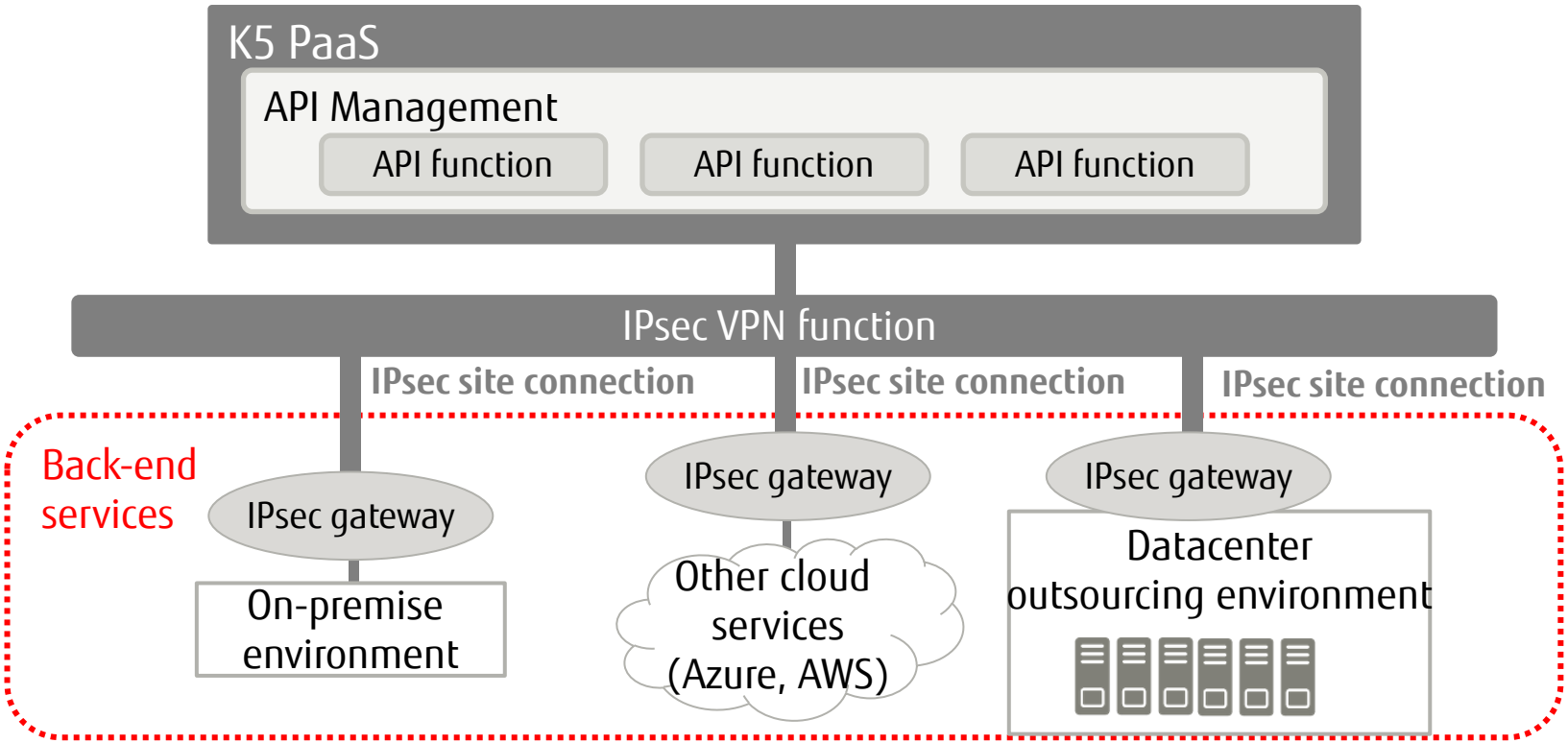
Using Java programs



Analytics & Monitoring Function – Back-end Secure Connection Function (IPsec VPN Connection)

A secure connection to back-end services built in the cloud or on-premise environment is made possible using the IPsec VPN function* of FUJITSU Cloud Service K5 IaaS. Data sources of the back-end services that cannot be deployed in a DMZ can now be accessed. Functions for gateway expansion can also be used.

* Refer to the following link for details on the IPsec VPN function.
https://k5-doc.jp-east-1.paas.cloud.global.fujitsu.com/doc/en/iaas/document/k5-iaas-features-handbook.pdf



Analytics & Monitoring Function – Web APIs

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- Web APIs
  - A REST API that enables HTTPS access to the API services using the HTTP client
  - Web APIs are published so that the following operations can be performed on the APIs
    - Procuring, uploading, and exporting of the SSL Certificate list (gateway extension function and back-end secure connection function)
      - The list can also be procured via the GUI.
    - Procuring analytics service data (procure statistical data on APIs, developers, and developer applications)
      - The data can be referenced via the GUI but Web APIs enable efficient analysis.
  - Follow the web page reference trail below for details on the Web APIs that can be used:
    K5 Portal> Documents> Manuals> API Management> “Web API Reference”

Service Account and Environment

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- ID / Password API
  - Notify the system administrator of the userID / password with administrative rights. This userID is permitted to add new user accounts.
  - Four roles are available: Organization Administrator, Operations Administrator, Business User and User.

- Organization, Environment
  - One organization is activated per contract.
  - Organization is a management unit of API Management.
  - Test and production environments are available for each organization.

API Management Service Menu (1/2)

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Service Menu

Menu	Billing unit	Comment
Basic		【Pro】 No. of API calls (* aggregated every 3 months) Pro (Fixed Menu) + Pay-per-use (Overage Option) • Fixed: 25 million calls/ 3 months • Overage Option: Per 2.5 million calls 【Standard】 No.of API calls (* aggregated monthly) Standard (Fixed Menu) + Pay-per-use (Overage Option) • Standard (3M): 3 million calls per month • Standard (10M): 10 million calls per month • Standard (20M): 20 million calls per month • Overage Option: Per 1 million calls
Pro		
APIM Pro	Month	
Standard		
APIM Standard (3M)	Month	
APIM Standard (10M)		
APIM Standard (20M)		
Advanced Gateway		
Pro		
Advanced Gateway Pro	Month	
Standard		
Advanced Gateway Standard (3M)	Month	
Advanced Gateway Standard (10M)		
Advanced Gateway Standard (20M)		
Backend Secure Connection		
Pro		
Backend Secure Connection Pro	Month	
Standard		
Backend Secure Connection Standard (3M)	Month	
Backend Secure Connection Standard (10M)		
Backend Secure Connection Standard (20M)		
Option		
Overage		
APIM Pro Overage	Per 2.5 million calls	
APIM Standard Overage	Per 1 million calls	

API Management Service Menu (2/2)

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Available Function for Pro/Standard

Available Function	Service plan	Basic Configuration		Gateway Extension Configuration		Back-end Secure Connection	
		Pro	Standard	Pro	Standard	Pro	Standard
(1) Gateway Service	1) APIs	○	○	○	○	○	○
	2) Publish	○	○	○	○	○	○
	3) Gateway Extension Function	–	–	○	○	○	○
(2) Analytics Service	Proxy Performance	○	○	○	○	○	○
	Target Performance	○	–	○	–	○	–
	Cache Performance	○	–	○	–	○	–
	Latency Analysis	○	○	○	○	○	○
	Error Analysis	○	–	○	–	○	–
	Developer Engagement	○	–	○	–	○	–
	Traffic Composition	○	○	○	○	○	○
	Business Transactions	○	○	○	○	○	○
	Devices	○	○	○	○	○	○
	Custom Reports	○	○	○	○	○	○
(3) Other functions		○	○	○	○	○	○
(4) Back-end Secure Connection Function		–	–	–	–	○	○
(5) WebAPI		○	○	○	○	○	○

○ : Available – : Not available

Billing Model (Pro Plan)

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Billing

- Fixed monthly fee + pay-per-use (Extra Call Option) are billed based on the number of API calls subscribed to for this service
- Fixed monthly fee: Fixed fee per month
  Note: No. of API calls that can be made: 25 million/ 3 months
- Pay-per-use (Extra Call Option): Per 2.5 million calls
  Note 1: Starts once the total number of API calls in a 3-month period exceeds 25 million
  Note 2: Billed/ invoiced at 3-monthly intervals
  However, if use of the service is canceled, billing/ invoicing takes place in the month that usage ends.

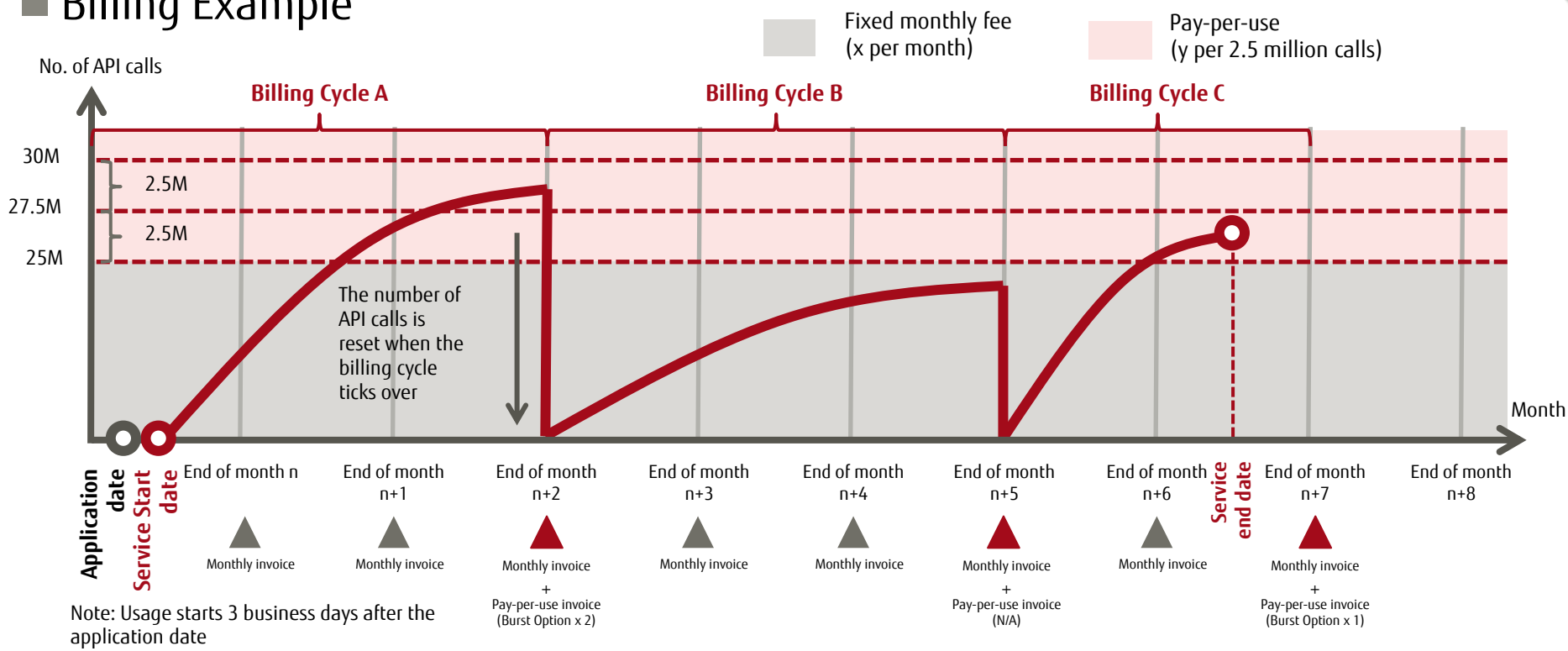
Service start and end dates

- The service start date is 3 business days after the date an application is lodged for using the service (i.e. the date an application is lodged via the K5 Portal).
- Fees are charged from the month in which the service start date occurs to the month in which the service end date occurs.
- The service end date is the date on which an application is lodged to turn off the service.

Refer to the next slide for billing example.

Billing Model (Pro Plan)

Billing Example



Note: Usage starts 3 business days after the application date

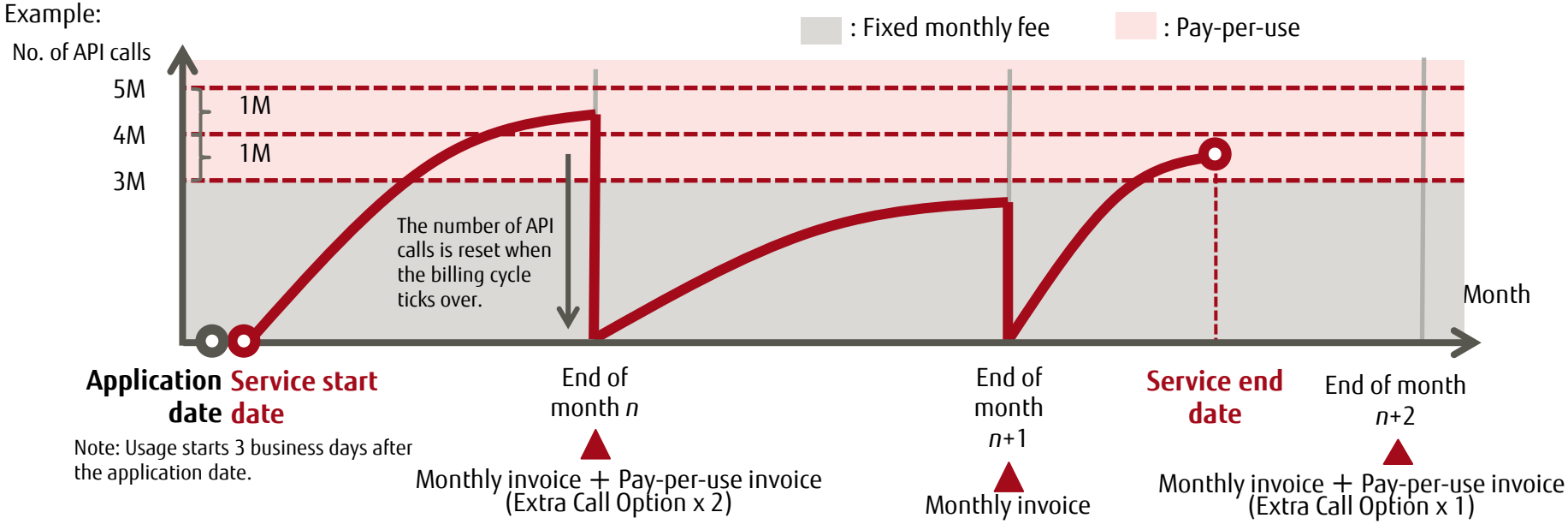
- **Billing Cycle A: Usage starts during month/ with pay-per-use**
  Aggregated quarterly, including usage start month. In the above example, the 25 million calls allowed under the fixed monthly fee plan is exceeded during the second month (month n+1), but is billed in the third month (month n+2) because of pay-per-use. Because 27.5 million< No. o f calls ≤30 million, month n+2 is billed at (x+2y).
- **Billing Cycle B: Continuous usage/ without pay-per-use**
  Pay-per-use billing does not apply because the total number of API calls for the quarter is less than 25 million. Month n+5 is billed at x.
- **Billing Cycle C: Contract canceled without the billing cycle reaching the full 3 months**
  Usage ends during the second month (month n+7) of the billing cycle. Pay-per-use is billed at the end of the month in which usage ends. Month n+7 is billed at (x+y).

Billing Model (Standard Plan)

Fixed monthly fee + Pay-per-use

- Fixed monthly fee + pay-per-use (Extra Call Option) are billed based on the number of API calls subscribed to for this service
- Fixed monthly fee: Fixed fee per month
  Note: No. of API calls that can be made: subscribed Plan per month
- Pay-per-use (Extra Call Option): Per million calls
  Note 1: Starts once the number of API calls in a month period exceeds the number of calls allocated by the Plan.
  Note 2: Billed/ invoiced at monthly intervals
- Service start date and service end date
  - Same as the Pro Plan.

Example:



Changing Plans

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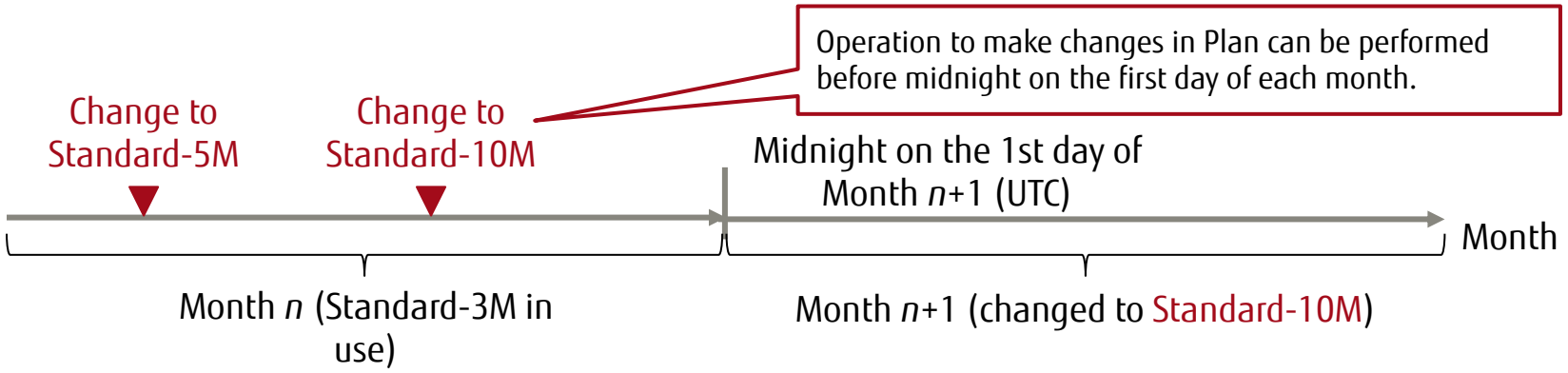
- The Customer may change their Plan to better suit their situation, such as the number of API calls and function usage.
  - The Customer can continue to use the same Organization, Environment, and registered API Proxies after changing the Plan.
  - There is no service down time (unable to log on to the service) while changing Plan.
- Changing of plans to and from the Basic Configuration, Gateway Extension Configuration, or Back-end Secure Connection Configuration is not permitted.

Changing Plans (between Standard Plans)

FUJITSU

How to Change Plans

- Plans can be changed via the “Service In Use” of the K5 Portal.
- The Customer will be billed for the Plan current at midnight (00:00) on the first day of each month (UTC).



Changing Plans (between Standard and Pro Plans)

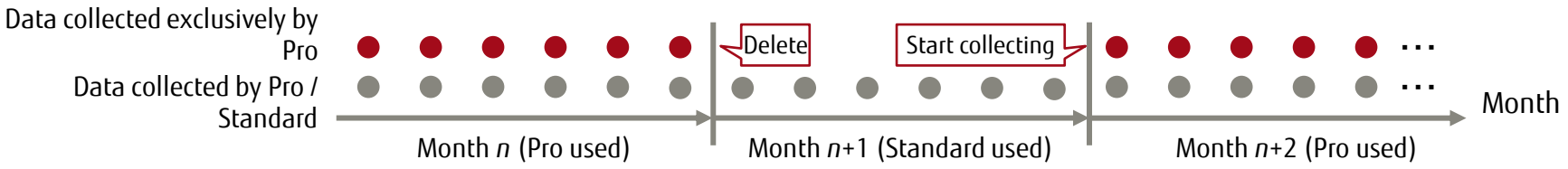
How to Change Plans

- Contact the Help Desk to change Plans from Pro to Standard or Standard to Pro. The Help Desk will advise the Customer on how to change plans.
  For details, refer to the FAQ published on the K5 website.
- The timing of the notification of Plan change will impact when the change takes effect.
  - If notified on or before the 20th: Effective from the following month
  - If notified between the 21st and the end of the month: Effective from the month after the next month

Notes on Changing Plans

Analytics Service

- When changing from the Pro to Standard Plan, data collected exclusively via the Pro Plan will be deleted. Therefore, the Customer will no longer be able to use the Analytics patterns provided exclusively via the Pro Plan.
- When changing from the Standard to Pro Plan, data collected exclusively by the Pro Plan will start accumulating. Therefore, from the month in which the Pro Plan begins, the Customer can start using the Analytics patterns provided exclusively via the Pro Plan.



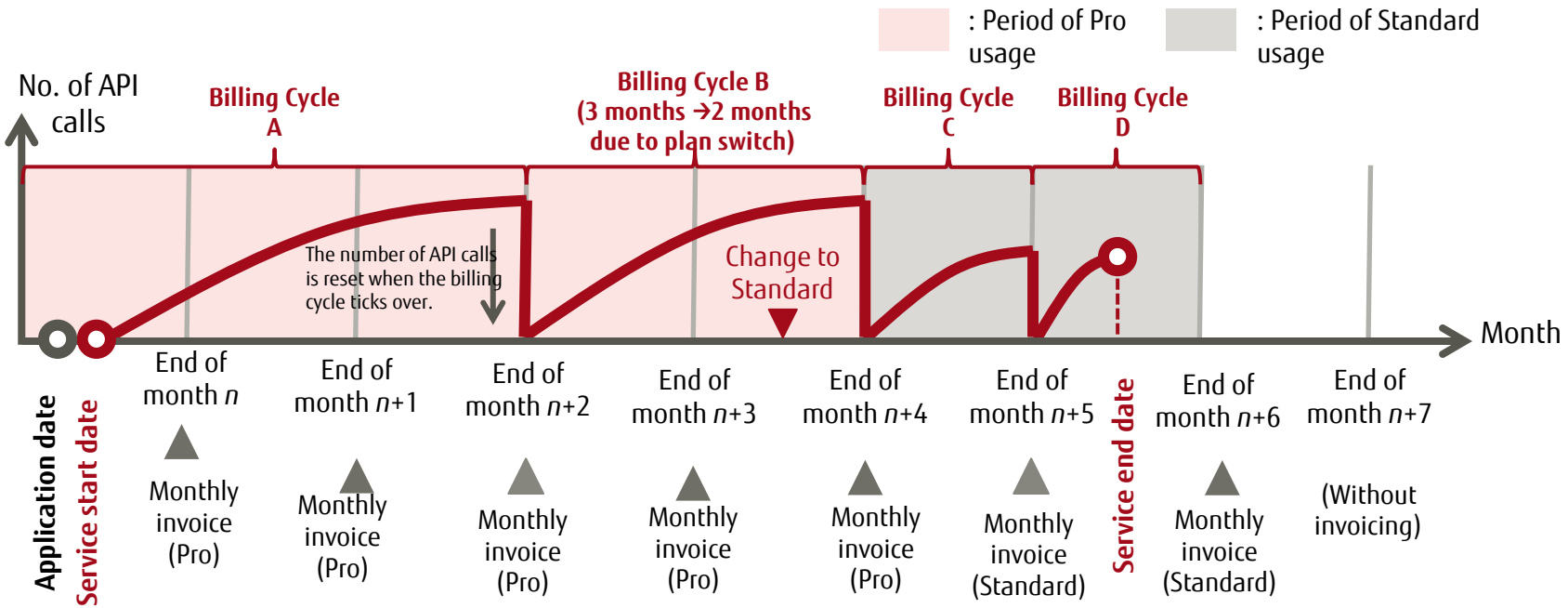
Changing Plans (between Standard and Pro Plans)

Notes on Changing Plans

Billing

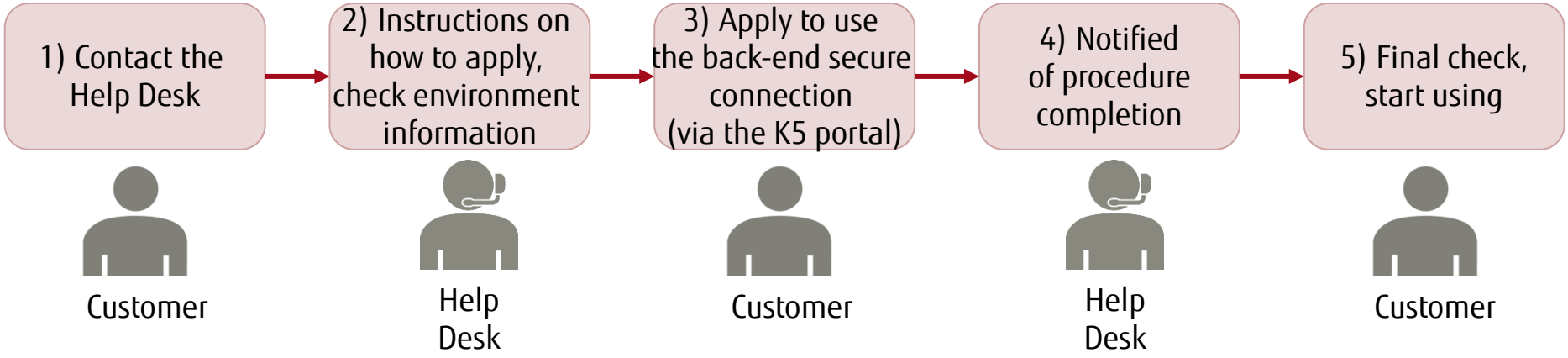
- The aggregation cycle of API calls (normally quarterly) is reset when the Plan is changed to Standard during the Pro billing cycle.

Example: The following sample shows the Plan changed to Standard during the second month of the Pro billing cycle (B) (effective from the next month).



Using the Back-end Secure Connection

- To connect to this service, the connection with the counterpart IPsec VPN gateway must be registered. Please contact the Help Desk for details.
  For details, refer to the following FAQs:
  https://apimng.uk-1.paas.cloud.global.fujitsu.com/docs/faq.pdf
- A flow of the stages leading up to service usage is as follows:



Restrictions and Notes

- Refer to the Service Description on the FUJITSU Cloud Service K5 website to confirm the regions in which this service is offered.
- The time required from application submission to start of service is as follows:
  - Basic Configuration Plan (Pro and Standard):
    Within three business days from completing the application via the service settings application screen on the K5 Portal.
  - Gateway Extension Configuration Plan (Pro and Standard):
    Deployment in the environment will be completed approximately 10 business days after the application has been submitted via the service settings application screen on the K5 portal.
  - Back-end Secure Connection Configuration Plan (Pro and Standard):
    Before lodging the application form, contact the Help Desk to confirm the information regarding the line connecting to the back-end services. The service can be used approximately 10 business days after confirmation of the line information.

APIM: Reference: Policy - Traffic Management

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API traffic processing (flow control, caching, etc.)

Policy	Description
 Quota	Uses the Quota policy to configure the number of request messages that an API proxy allows over a period of time; such as a minute, hour, day, week, or month
 Spike Arrest	Throttles the number of requests generated per second e.g. If set to allow 30 requests every minute(30pm) then 1 request will be allowed in 2 seconds. If it receives 2 requests within 2 seconds, then the 2nd request will be denied.
 Concurrent Rate Limit	Throttles inbound concurrent connections from your API proxies running on Apigee Edge to your back-end services
 Response Cache	Caches the response from a back-end resource
 Lookup Cache	Retrieves the data cached by Populate Cache
 Populate Cache	Caches data such as session IDs, authorization values, etc.
 Invalidate Cache	Deletes cached data specified in the conditions
 Reset Quota	Allows resetting of the no. of requests counted by the Quota policy based on specific variables

APIM: Reference: Policy - Data Processing

FUJITSU

API data processing (format change, message modification, etc.)

Policy	Description
JSON to XML	Converts messages from JSON format to XML format
XML to JSON	Converts messages from XML format to JSON format
Raise Fault	Generates a custom message in response to a status code (error condition)
XSL Transform	Transforms XML to another format, such as HTML, plain text or other format
SOAP Message Validation	Validates a message against an XSD schema or WSDL definition and rejects the message if it does not conform
Assign Message	Creates or modifies an HTTP request or response messages (during an API proxy flow)
Extract Variables	Extracts information from a request or response and sets a variable (with the specified message content)
Access Entity	Retrieves the entity profiles of developers, apps, API products, etc. and places these in a variable
Key Value Map Operations	Key / Value pairs can be stored, retrieved and deleted using PUT, GET, DELETE

APIM: Reference: Policy - Security 1/2

FUJITSU

API security restrictions (Authorization, Vulnerability Management, etc.)

Policy	Description
Basic Authentication	Sets Basic Authentication (Base64 encoding and decoding)
XML Threat Protection	Addresses XML vulnerabilities and minimizes attacks on your API
JSON Threat Protection	Addresses JSON vulnerabilities and minimizes attacks on your API
Regular Expression Protection	Rejects requests that include regular expressions
OAuth v2.0	Allows you to configure (generate and verify access tokens, etc.) OAuth v2.0 endpoints
Get OAuth v2.0 Info	Retrieves the attributes of OAuth v2.0's access tokens and authorization codes, etc.
Set OAuth v2.0 Info	Adds or updates custom attributes associated with OAuth v2.0 access tokens

APIM: Reference: Policy - Security 2/2

FUJITSU

API security restrictions (Authorization, Vulnerability Management, etc.)

Policy	Description
OAuth v1.0a	Allows you to configure (generate and verify access tokens, etc.) OAuth v1.0a endpoints
Get OAuth v1.0a Info	Retrieves the attributes of OAuth v1.0a`s access tokens, authorization codes, etc.
Verify API Key	Allows you to configure the API Key that allows access
Access Control	Allows or denies access to your APIs based on IP address
LDAP	Allows you to configure LDAP
Generate SAML Assertion	Attaches SAML assertions to outbound XML requests
Validate SAML Assertion	Validates SAML assertions that are attached to inbound SOAP requests and rejects them if they are invalid

APIM: Reference: Policy - Extension

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Execute scripts and collect data in a message.

Policy	Description
 JavaScript	Implements custom behaviors using JavaScript
 Service Callout	Allows calls to an external service (from your API proxy flow)
 Statistics Collector	Collects statistics for data in a message, such as product ID, price, target URL, etc.
 Message Logging	Logs custom messages to a local disk or to syslog

APIM: Reference: Analytics List

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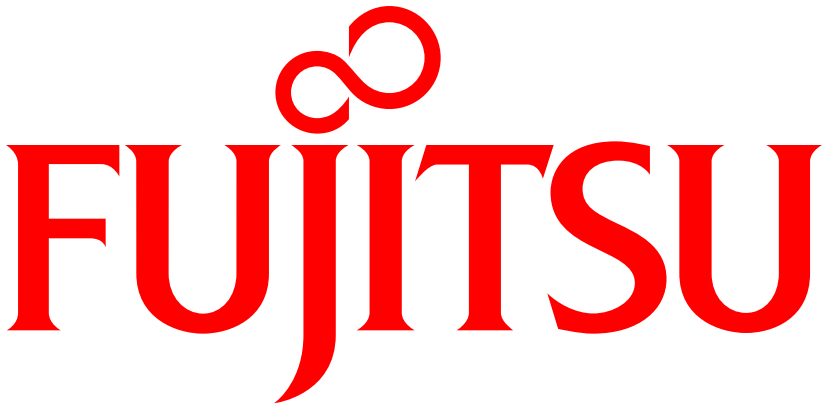
Display traffic volumes, response times, no. of errors, etc.

Policy	Description
Proxy Performance	Shows API traffic volumes and average processing times
Target Performance	Shows traffic volume patterns, success and failure of requests, response times, success and failure of responses, and payload size of back-end services
Cache Performance	Shows cache hits, cache hit rates and response times
Latency Analytics	Shows the response times for API and back-end services
Error Analytics	Shows error data (no. of errors, status codes, etc.) for API proxies and targets
Developer Engagement	Shows the no. of your registered app developers and their access status, traffic generated by them and errors
Traffic Composition	Gives a quick glance at the top 10 traffic patterns of APIs, products, developers, and applications
Business Transactions	Shows traffic volumes, response times, error rates, and amount of data exchanged (aggregate of requests and responses) based on a request generated by a specific URI
Devices	Provides information on the devices (platforms, agents, device types, OS, etc.) being used to access your APIs
Reports	Allows free selection of the matrix and dimensions (time) and generates charts



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