

Smart City/Community Services and Infrastructures in Saitama City

Prof. of Keio University

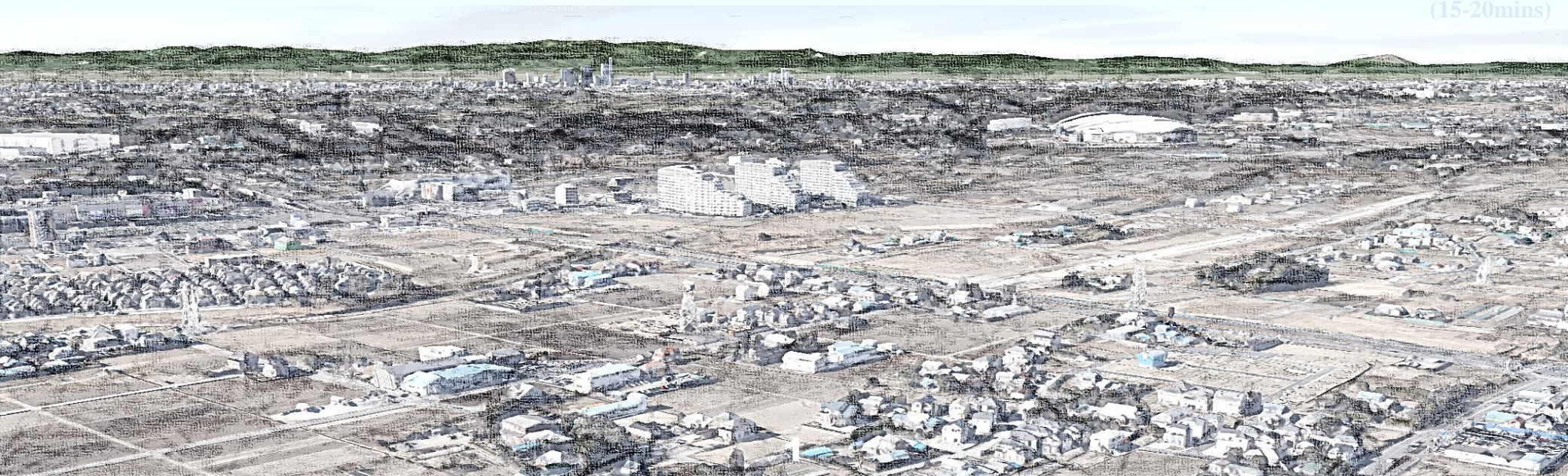
Chair person of Misono Town Management Consortium

President of Omotenashi ICT Consortium

Director of Edge Platform Consortium

Hiroaki Nishi

(15-20mins)





UDCMi

Urban Design Center Misono

- Smart City / Town Project @Saitama City
 - 320ha around Urawa-Misono Station
 - Planned population 30,000 (7,000)
- Urban Design Center Misono
 - Center for smart town services
- Members
 - Saitama City
 - Keio Univ., Kougakuin Univ., Shibaura Tech Univ., Tokyo Denki Univ.
 - AEON Retailing Group, Softbank, Tokyo Gas, IBM Japan, Felica Pocket Marketing, Tanita, Panasonic, Mitsubishi
 - Local house building companies, Local banks (32 companies and organizations)



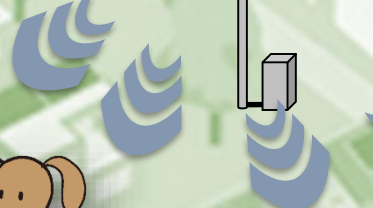
UDCMi Services

Town Area

Town security (SECOM)



BLE positioning system



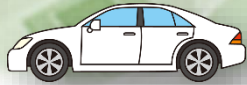
Distributed PV management



Bicycle (AEON)



Pet (AEON)



Collision avoidance (HONDA)



watching children go to school

Residential Area



EMS (TOSHIBA)



HGW

BLE



Smart Meter Reader (IIJ)



Smart Meter



EMS (Panasonic)

Smart house with Home energy management system

Providing new Smart City services

- UDCMi system provides flexible application program execution environment.
 - Supports on-the-fly anonymization
 - Encapsulation of private information
- Relationship management (service vendors and users)

UDCMi Edge



Keio Univ.



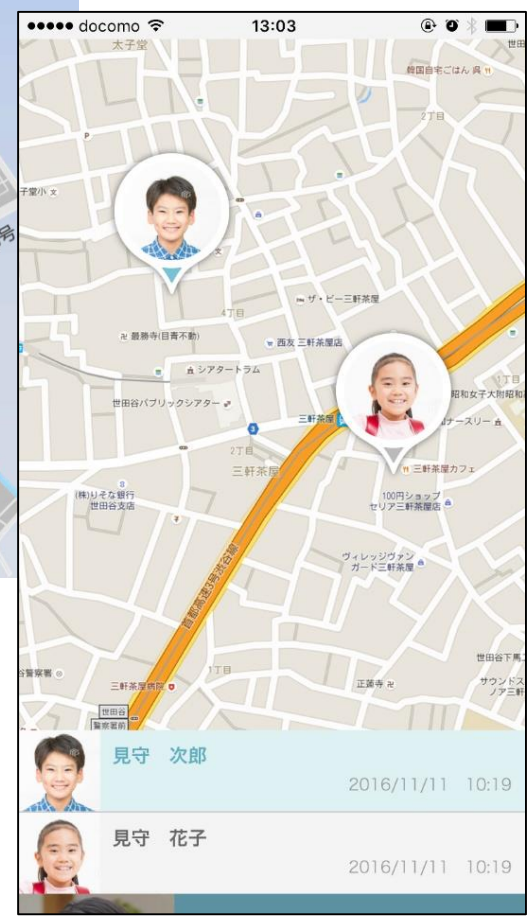
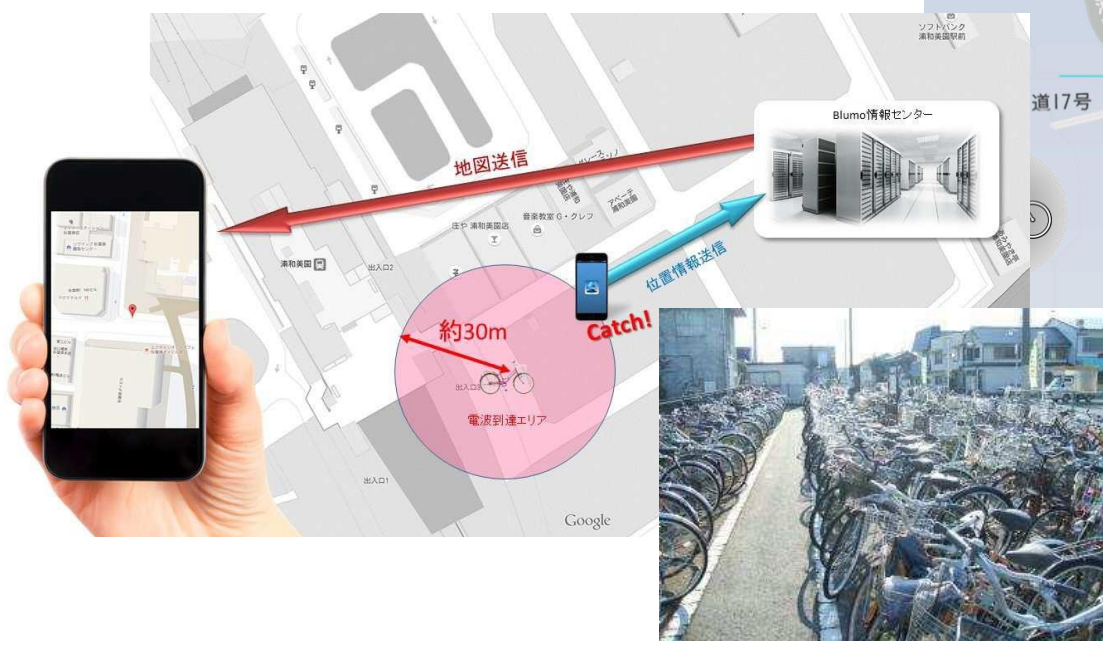
Health information (TANITA)

e-money card (AEON)



Commercial Area

BLE Positioning Service

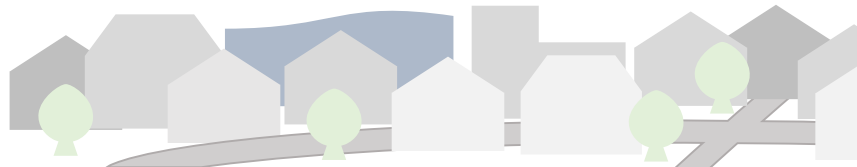
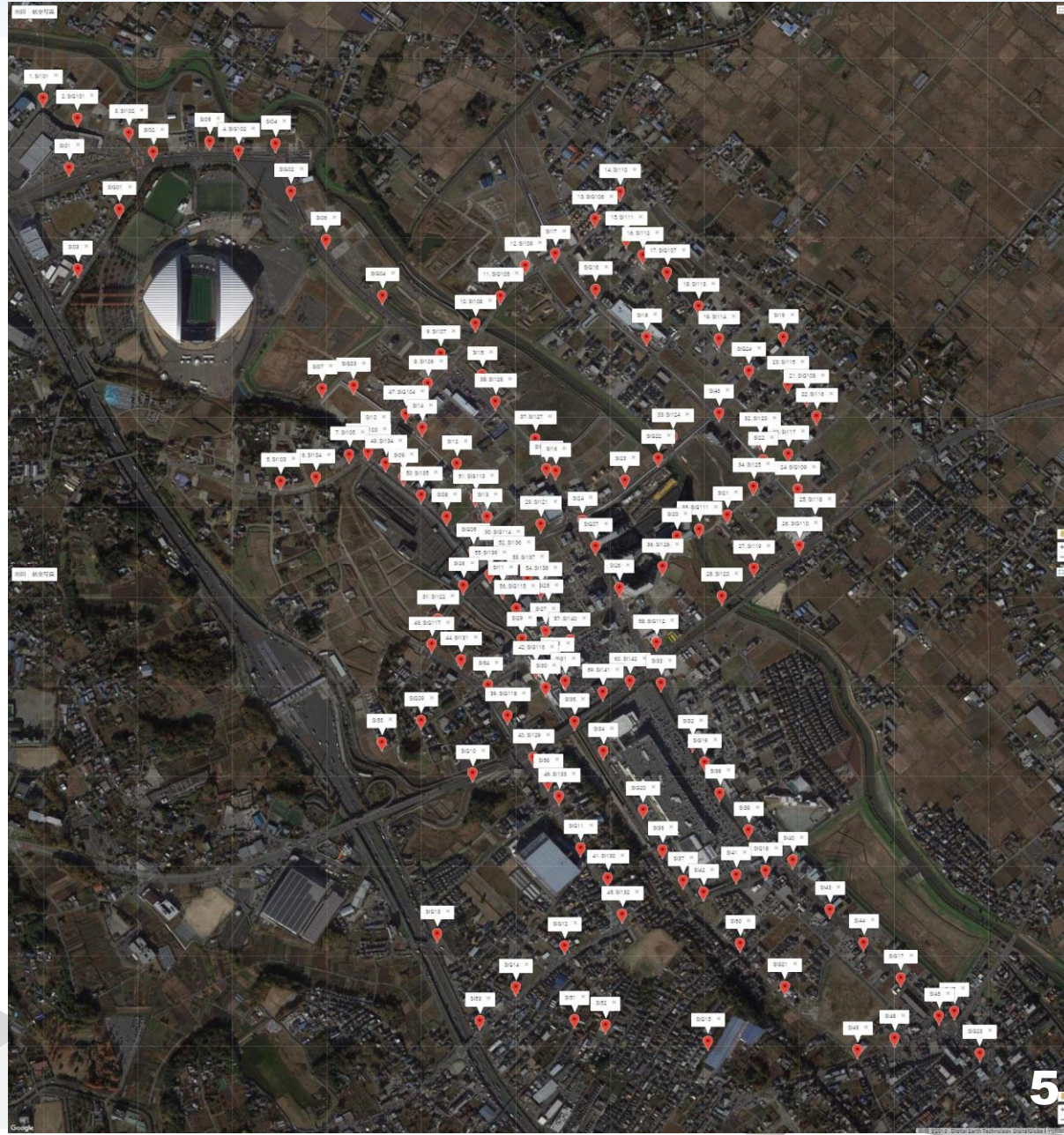




BEL Antennas (BLE Spot)



- 140 BLE Spots are implemented in the target area
- Expected resolution is about 10m error
- Ready for 2 years without any battery charge or change
- Internet communication is not necessary





Health Monitoring Service



Activity meter powered by e-money card



e-money card with medical records





Home Energy management System



Smart Meter Reader



HEMS Monitor



Floor, windows temp. sensor



Outdoor environment PM2.5 sensor



iPad



BLE Beacon



Temp., Humid., Illumi. sensor



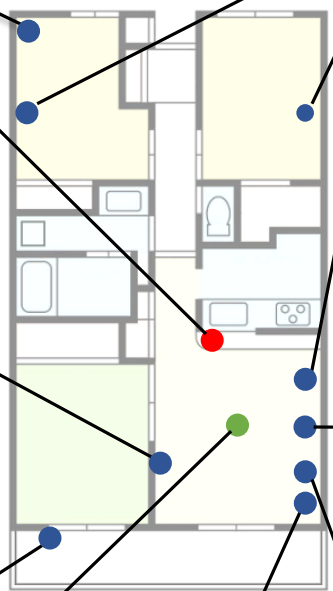
Carbon dioxide sensor



IrDA signal Receiver/transmitter



Indoor globe temp. Sensor LED indicator



Usage Details

Usage of Bathroom

Items	This month	Previous month	Same month a year ago	Comments
Total usage	62,442kwh	67,259kwh	8kwh	It seems that you did not use them in the same month last year.
Dryer's usage	62,442kwh	62,836kwh	8kwh	
Duration of usage	744,0hours	739,5hours	744,0hours	It seems that you did not use the dryer when it was sunny in this month. Please consider drying clothes in the sun as possible.
Frequency of usage	0times	5times	0times	
Duration of usage at night ※	310,0hours	386,5hours	310,0hours	The frequency rate of electrical use of dryer at night is 40%. It is desirable to use dryers at night.

※22:00-7:00 (next day)

Usage of Kitchen

Items	This month	Previous month	Same month a year ago	Comments
Total usage	54,068kwh	55,244kwh	0kwh	It seemed that you did not to use them in same month of last year.

Sockets
Total usage 47,14kwh 4
Base Consumption 0,951kw 6

IH Cooker
Total usage 6,928kwh 8
Most used time period 20:00-21:00 2
2,911kwh 2

Usage Details

Usage of Eco Cute

Items	This month	Previous month	Same month a year ago	Comments
Total usage	482,124kwh	224,552kwh	8kwh	It seems that you did not use them in the same month last year. Please consider resaiting the temperature or the amount of hot water
Duration of usage	367,0hours	220,5hours	8,0hours	If you take measures, such as not boiling hot water at night when the expense of electricity is low, you can reduce amount of electricity consumption up to 102,60kwh.
Frequency of usage	61times	97times	8times	
Re-boiling	45times	72times	8times	

Usage of Lighting and Sockets in LD rooms

Items	This month	Previous month	Same month a year ago	Comments
Total usage	68,276kwh	69,366kwh	8kwh	It seems that you did not use them in the same month last year. Please consider turning off all appliances when not in use.
Base Consumption	0,864kw	0,969kw	0,0kwh	

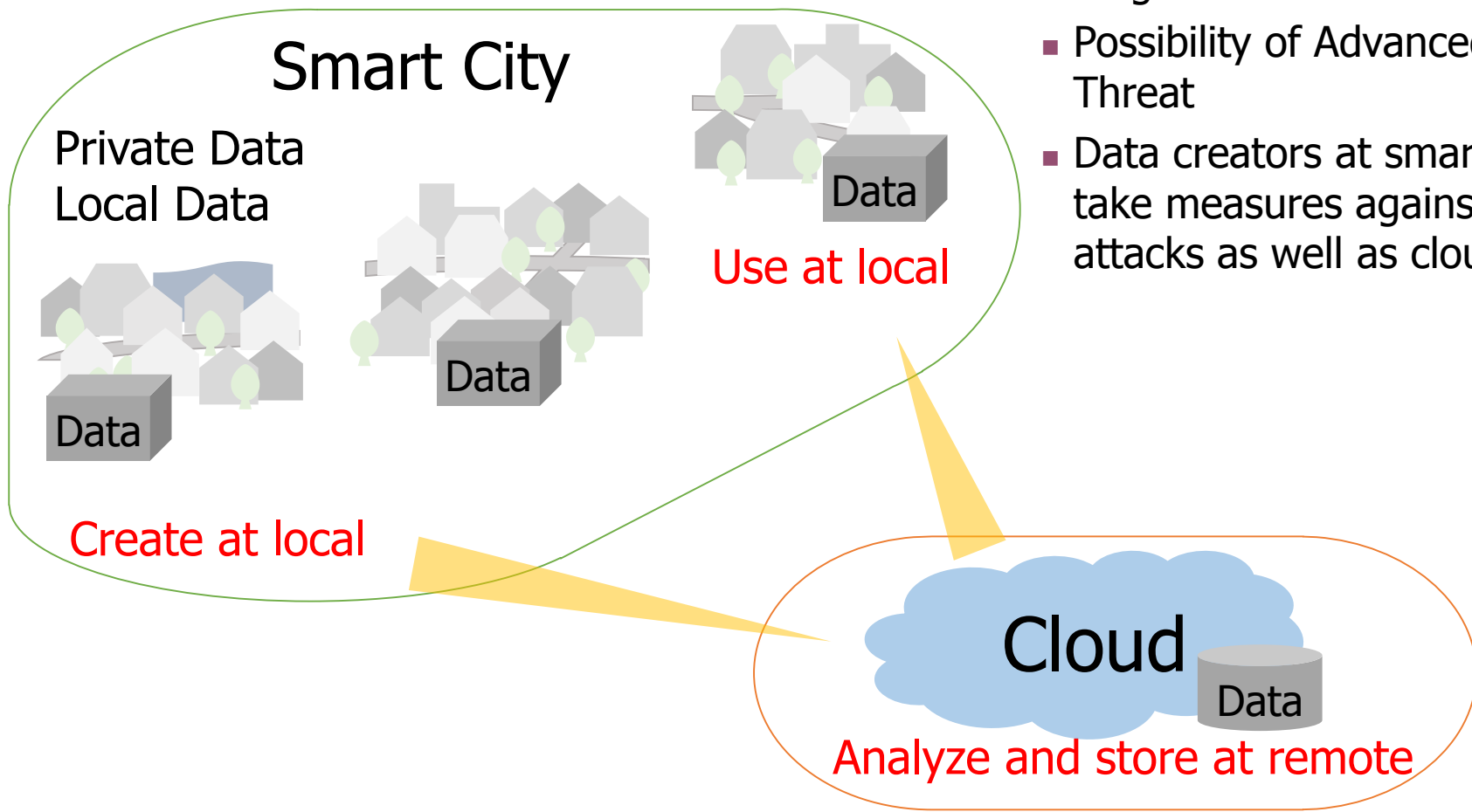
Usage of AC in LD rooms

Things	This month	Last month	Same month a year ago	Comments
Total Usage	5,113kwh	0,232kwh	8kwh	It seemed that you did not to use them in same month of last year.
Duration of use at night	0days	0days	0days	It seemed that you did not to use them all night in this month.





Smart Community Data Privacy/Security



- Single Point of Failure Problem
- Possibility of Advanced Persistent Threat
- Data creators at smart city must take measures against cyber attacks as well as cloud services





Smart Community Data Privacy/Security

Smart City

Private Data
Local Data

Create at local
Store at local
Analyze at local
Use at local
Anonymize at local

Data
Local services

Data
Local services

- Share appropriately anonymized data only
- Private data is encapsulated in local areas
- Locally provide private services and globally provide common services
- Cyber attack cost becomes high

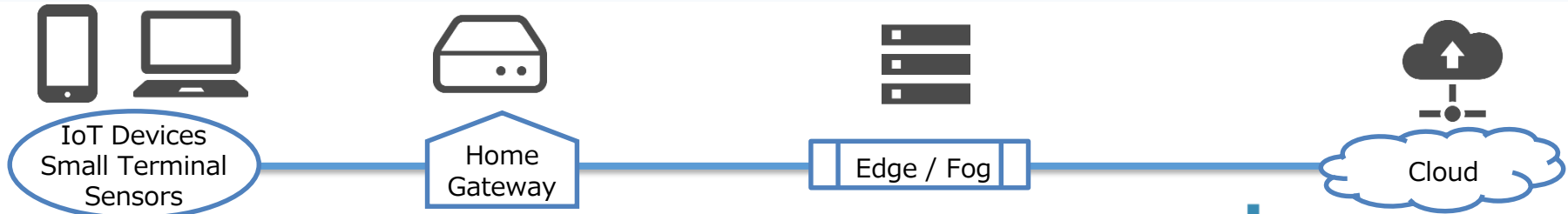
Share data for global service

Cloud
Data
Globally analyze and store at remote





Smart Community Information Platform

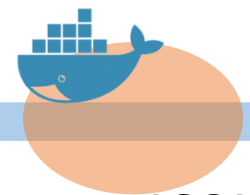
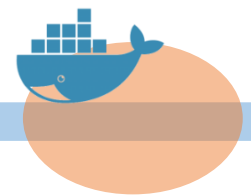


Use of Cloud Service (Conventional)



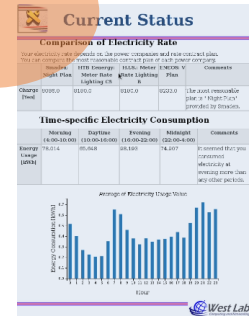
Service Application

Service Migration to Fog (Advanced)

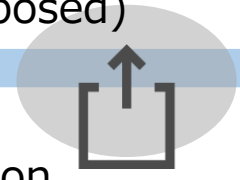


ASCA

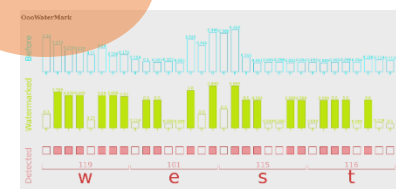
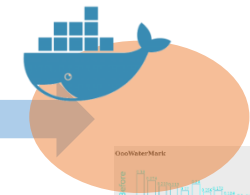
ASCA



Service Migration to Fog (Proposed)



ASCA
Anonymization
Watermark Printing

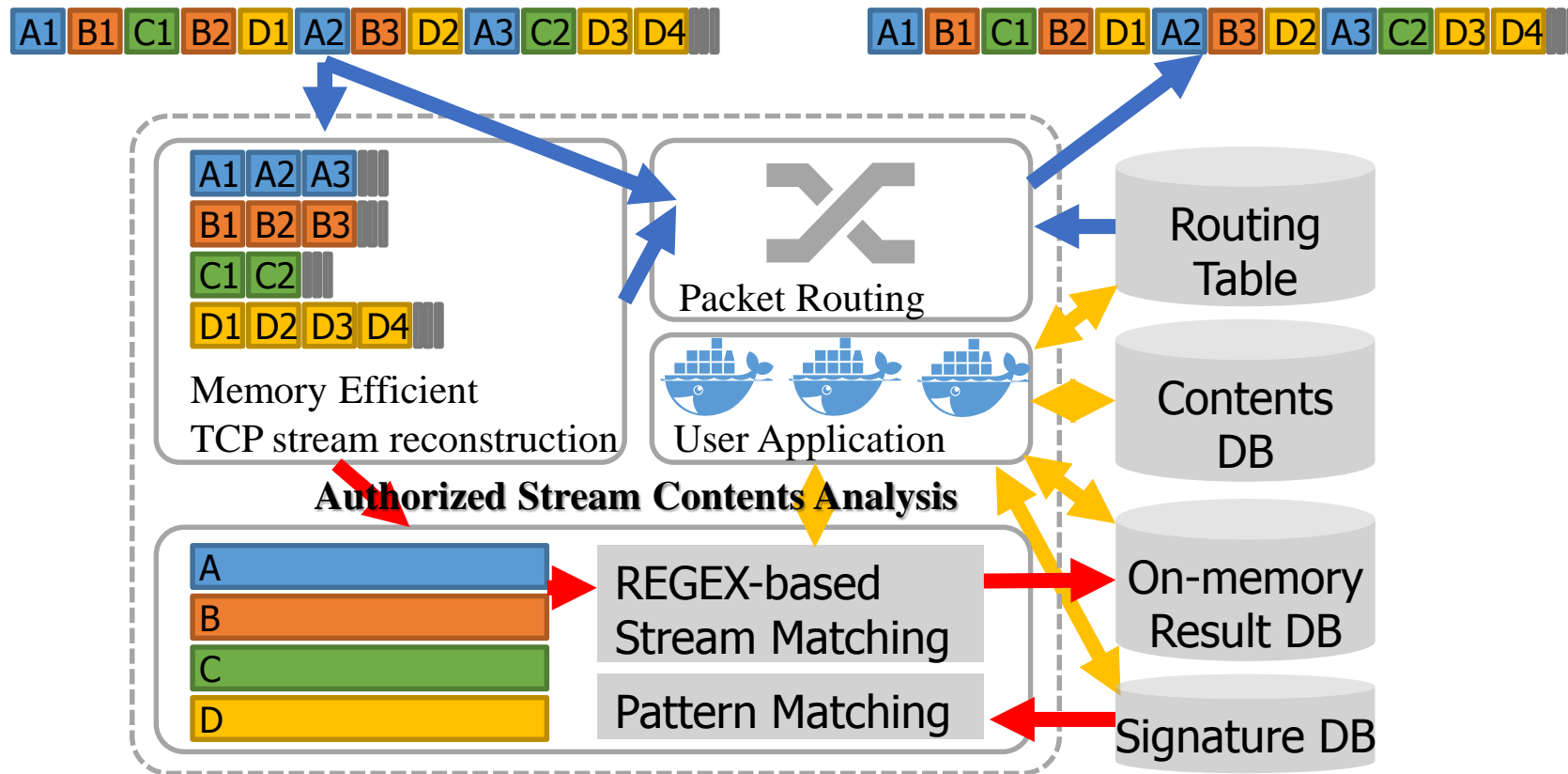


No need to change DIP address and protocols





ASCA at Gateway/Switch/Router

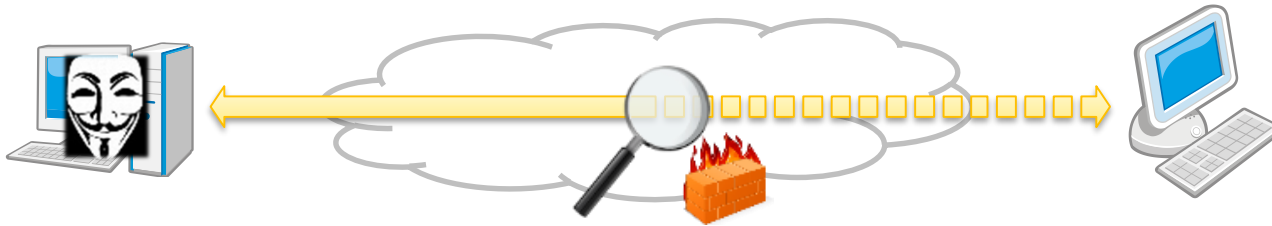


ASCA (Authorized Stream Contents Analysis) for analyzing reconstructed TCP streams

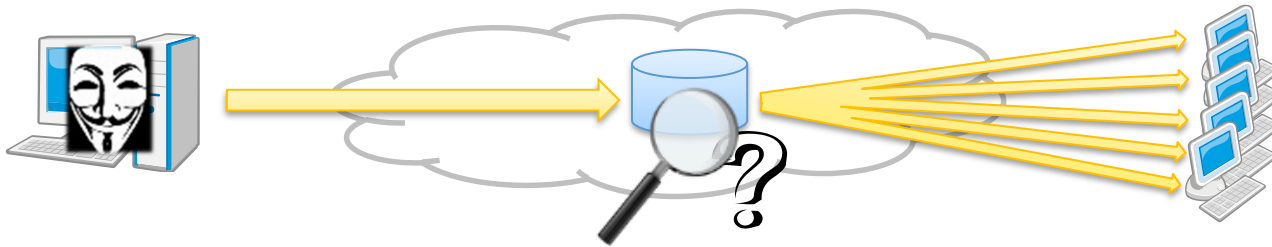
- Authorized applications on gateway, switch, or router share SSL key with Cloud
- ASCA achieves SSL, gzip, chunk decode of +2 million TCP streams in parallel

Applications

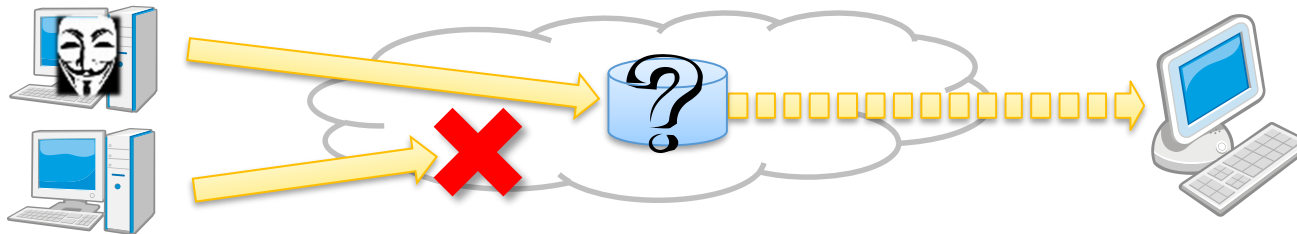
- Protect IoT devices from intrusions by using devices located in the middle of the Internet



- Surveillance of suspicious-looking accesses for providing proactive security

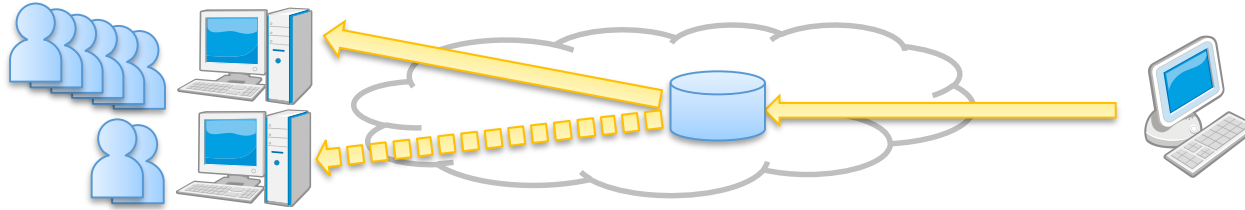


- Find and remove phishing attacks by checking routes

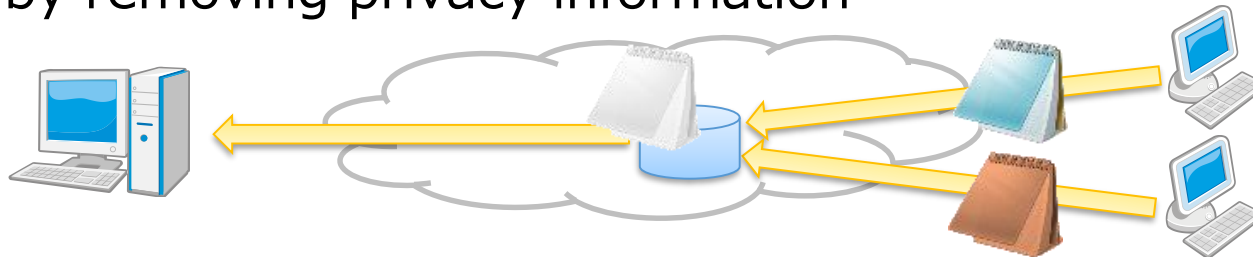


Applications

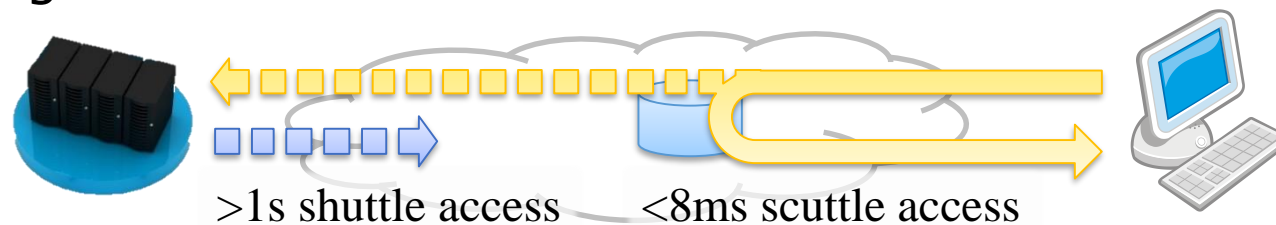
- Provide new services using user behaviors



- Solve the problem of privacy revealing and enhances the service availability by removing privacy information



- Provide time-critical privacy-critical services at low latency by encapsulating local data and services



ASCA Platform

2012

Software based
ASCA Router

AlaxalA AX5000 Service Module Card



SoR (4U + EPON)
DPDK + HyperScan + QAT

Juniper JunOSV AppEngine



SoR (2U x 2 + LED Panel)
DPDK + HyperScan + QAT

2015

Hardware Accelerated
ASCA router



2018

GPGPU / ManyCore for ML

μSoR (11.5 x 11.5 x 5cm)
Small size full function
DPDK + HyperScan



SoR on Xeon Phi Knights Mill
DPDK + HyperScan + QAT





Demonstration of VCRM

The screenshot displays a web browser window on the left and three terminal windows on the right. The browser window shows a web page titled "Urban Design Center of Misori" with a "Welcome!" message and a form containing fields for "User ID: v00001", "Service ID:", "Vender ID:", "Privacy Level:" (set to 1), "Data Type:" (set to power), and "interval:". A "Send" button is located at the bottom of the form, and a "home" link is at the bottom left. The terminal windows show the following content:

- Terminal 1 (top):

```
Session: 0 3 1 localhost:~/code/ppm/CMsys/restserver/relation/class*> [2017-03-06(Mon) 17:35]
niwa@localhost class$./a.out
socket running
```
- Terminal 2 (middle):

```
pi@raspberrypi ~/NIWA/soap_stand_alone_server $
./standaloneserver
Socket connection successful: master socket = 4
```
- Terminal 3 (bottom):

```
pi@raspberrypi:~/NIWA/soap_stand_alone_server $
./standaloneserver
Socket connection successful: master socket = 4
```

Text overlays on the terminal windows identify them as "Gateway1", "Gateway2", and "Gateway3". The text "Relationship Manager" is overlaid on the bottom terminal window.



Demonstration of Smart Service

The screenshot shows a Mozilla Firefox browser window displaying the GCTC GUI. The browser's address bar shows 'localhost:3333'. The page has a sidebar menu on the left with items like HOME, WESTLAB MY PAGE, GITHUB, GITHUB.IO, and YOUTUBE. The main content area features a header 'GCTC GUI by Westlab, Keio University', a large title 'GCTC GUI', and a sub-header '(re)write JSON file from web browser.' Below this is a 'file list' section with a 'REFRESH (FILELIST)' button and three file entries: 'ANONYMIZER.JSON', 'RECOMMENDATION.JSON', and 'WATERMARK.JSON'. At the bottom, there is an 'input filename to be read on server' field containing 'recommendation.json'. The browser's taskbar at the bottom shows the terminal window 'root@localhost:~/gctc' and the browser window 'GCTC GUI - Mozilla Firefox'.





Thank you

