TELKOMSEL
ioT

Telkomsel Presentation
"IoT for Making Indonesia 4.0"

Jakarta Convention Center, 28 November 2018

By:
Alfian Manullang
GM. IoT Smart Connectivity

Content of Sharing

- **Digital Revolution**
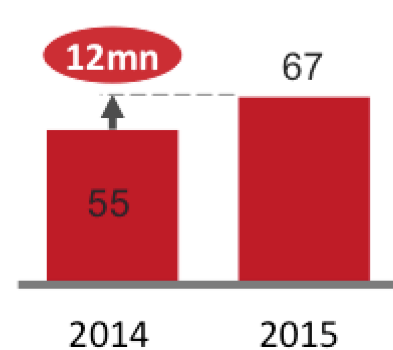- **IoT Overview**
- **Telkomsel IoT**

The digital revolution has arrived in Indonesia
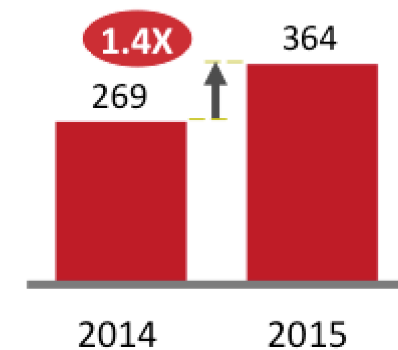
Mobile internet

Total mobile internet users
Mn

12mn

55	67
2014	2015

73% mobile internet users

Cloud technology

Total cloud services vendor revenues[1]
Mn USD

1.4X

269	364
2014	2015

Internet of Things

Total connected devices
Mn Units

7Mn

32	39
2014	2015
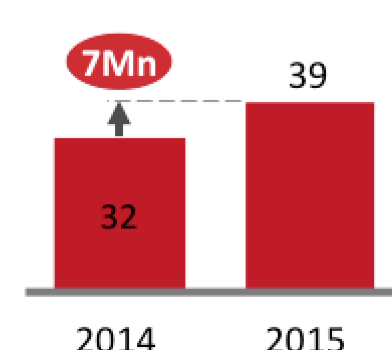
Big data and advanced analytics

Internet Protocol traffic per month
Petabyte[2]

60%

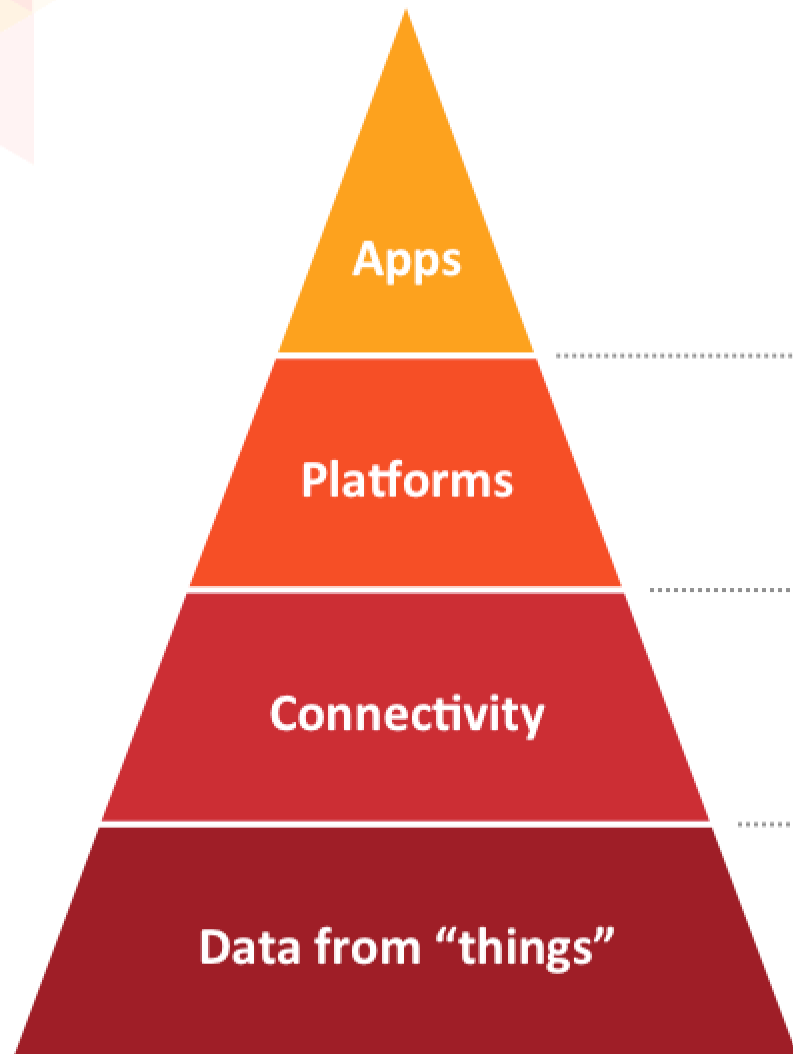|	
277	448
2014	2015
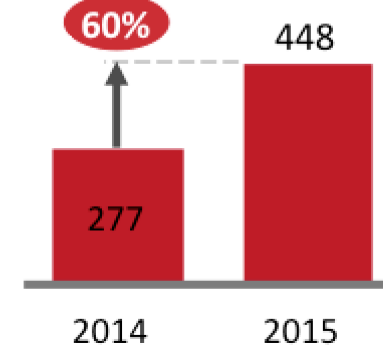
1 Revenues from public cloud services and cloud IT infrastructure   2 Petabye = 1 million gigabyte

SOURCE: eMarketer, We Are Social, Machina, IDC Worldwide Public cloud services and cloud IT infrastructure tracker, Cisco

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Key elements of an Internet of Things business

Apps

Platforms

Connectivity

Data from "things"

Applications that enable IoT use cases, e.g.
- Predictive maintenance for manufacturing plants
- Fuel savings for a truck fleet
- Stolen vehicle recovery for a bike owner

Platforms that connect, organize, and analyze the IoT data, e.g.,
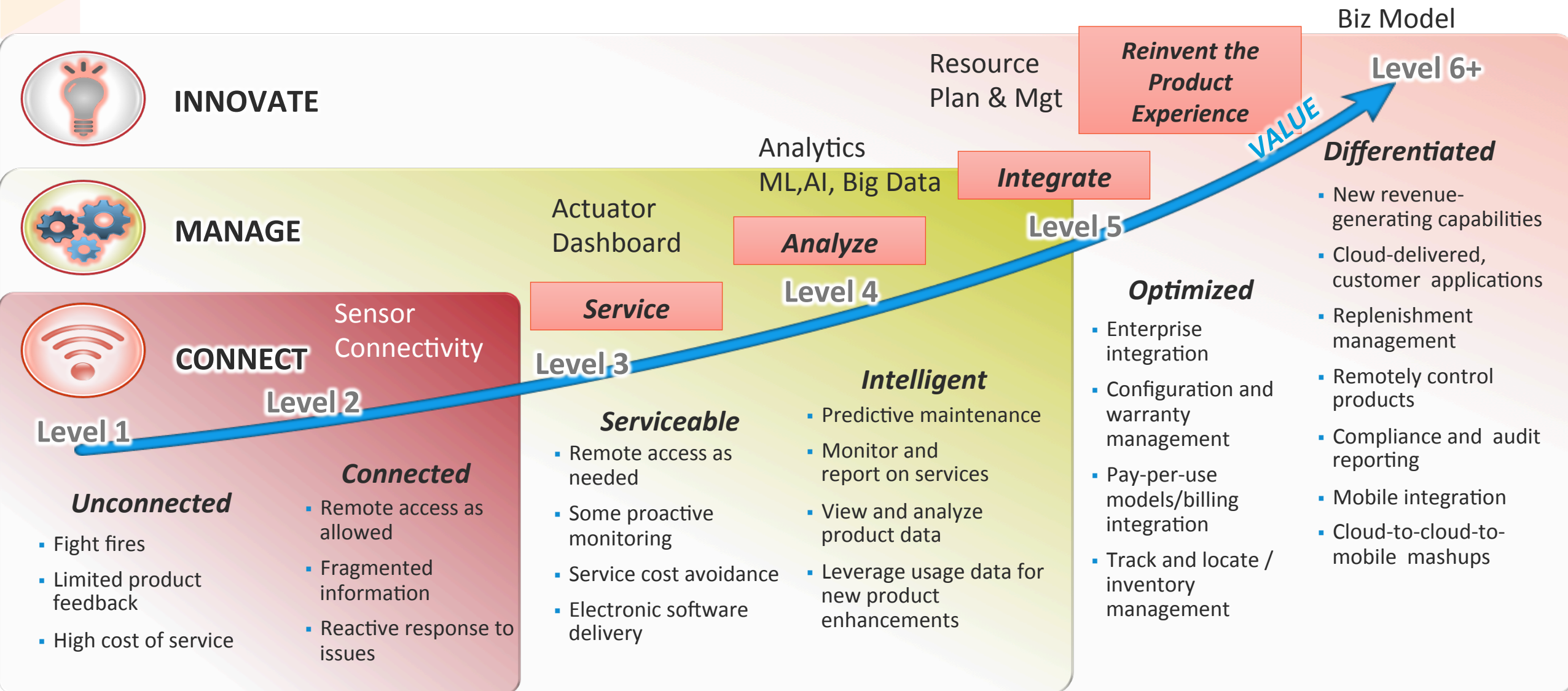- Microsoft Azure IoT suite, IBM Watson, AWS, Cisco Kinetics

Networks that connect the devices (things) to each other and ...

Data streams that use sensors, e.g.
- Location, temperature, humidity of a moving truck using SIM-enabled sensors
- Vibration and pressure of a pump transmitted using a Wi-Fi gateway

IoT Connected Product Value Curve and Maturity Levels

Setting the Strategy for Next-Generation Business Models

Biz Model

INNOVATE
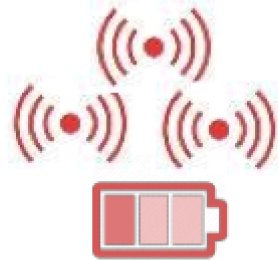
Resource Plan & Mgt

Reinvent the Product Experience

Level 6+

Analytics ML,AI, Big Data

MANAGE

Integrate

Differentiated

- New revenue-generating capabilities
- Cloud-delivered, customer applications
- Replenishment management
- Remotely control products
- Compliance and audit reporting
- Mobile integration
- Cloud-to-cloud-to-mobile mashups

Actuator Dashboard

Analyze

Level 5

Level 4

CONNECT

Sensor Connectivity

Service

Optimized

- Enterprise integration
- Configuration and warranty management
- Pay-per-use models/billing integration
- Track and locate / inventory management

Level 3

Intelligent

Level 2

Serviceable

- Predictive maintenance
- Monitor and report on services
- View and analyze product data
- Leverage usage data for new product enhancements

Level 1

Connected

- Remote access as needed
- Some proactive monitoring
- Service cost avoidance
- Electronic software delivery

Unconnected

- Remote access as allowed
- Fragmented information
- Reactive response to issues

- Fight fires
- Limited product feedback
- High cost of service

VALUE

IOT Technology choices

2G-4G   **Wireless**   **Fixed**

Satellite   **LPWA**

Several wireless technologies are competing for IoT connectivity

Throughput in Kbps

10 000 000 / 1 000 000 / 100 000 / 10 000 / 1 000 / 100 / 10 / 1

Cellular-5G

WiFi

Cellular – 4G

Bluetooth

Cellular – 2G/3G

ZigBee

Cellular - 5G

Satellite

LPWAN

Range in meter

1 / 10 / 100 / 1 000 / 10 000 / 100 000 / 1 000 000

Source: Gartner, Feb. 2016

The Boston Consulting Group

Draft – for discussion only

BCG Telkomsel IOT CSO

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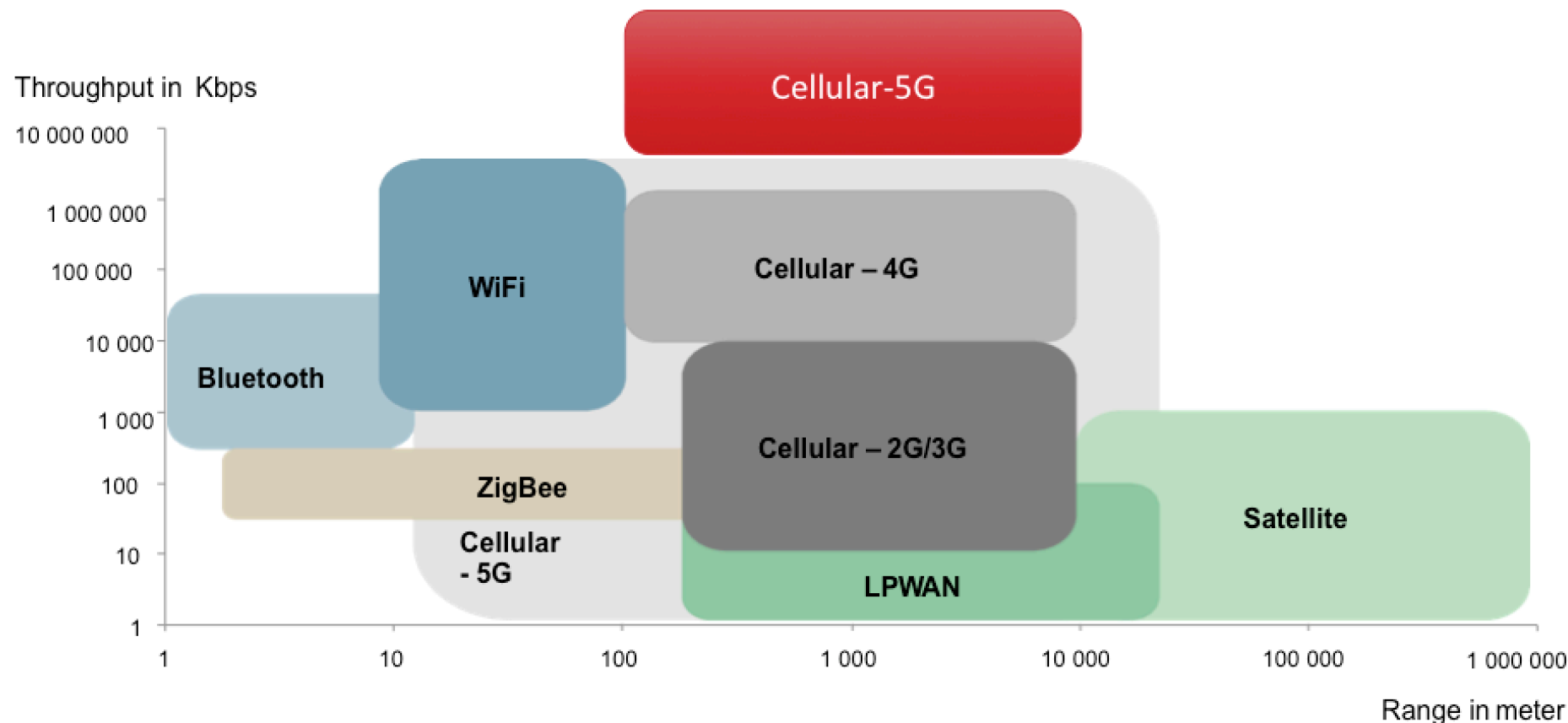
Comparison Between Broad band and Narrow Band

|	Broad Band LTE / 3G	(Narrow Band) NB-IoT
Data Size (Payload)	Large Packet Size/payload (mostly >10 MB)	Small Packet Size/payload (less than 1MB)
Max Quota	Unlimited in bulk/group (500 GB per SIM)	10 MB (per SIM)
Data Rate	High data rate (average >2 Mbps)	Low data rate (average 30kbps)
Bandwidth Requirement	Large bandwidth (5-20 Mhz)	Low bandwidth (180 Khz)
Delay	Low delay tolerant or real-time apps (latency below 1s)	High delay tolerant (latency 1.5s-10s)
Battery	only Days or weeks	Up To 10 Years
Cost (Device and Connectivity)	3G module $16 4G module $26 connectivity Cost $3/month	NB-IoT Module $5 - $7 connectivity cost >$0.7/month (1MB)
Power Consumption	High power consumption Transmit : 4-5 watt standby : 0.5 watt	Low power consumption (using battery or off grid area) Transmit : 0.5-07 watt, standby : 0.05 watt
Coverage Characteristic	Short-mid coverage (up to 2km)	Long range coverage up to 5-7km and deep penetration (concrete building, underground and basement)

What does NB-IoT deliver?
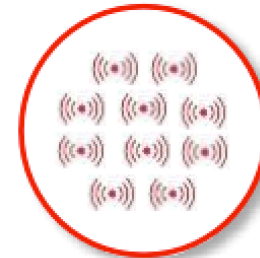
Optimised power consumption
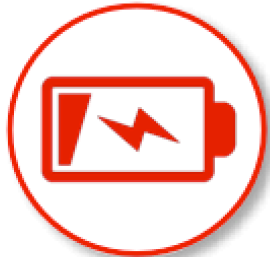
>10 year battery life

High propagation: better coverage

M2M

GSM

X7 area

NB-IoT

2 walls
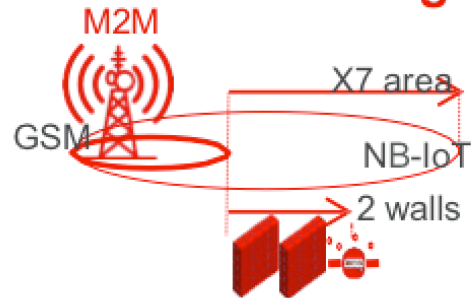
+20dB link budget (vs. GSM)

High end-point density

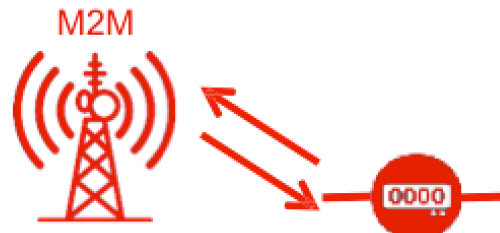>100,000 connections per cell

Low complexity devices

Targeting modules costing just a few $

Limited throughput

<200kbps

Bi-directional communication

M2M

Uplink and downlink capability

LTE level security

Encryption, SIM based authentication

Global standard in licensed spectrum

3GPP
A GLOBAL INITIATIVE

Standardised R13 (June 16)

What are the technology options for LPWA?

	Unlicensed Services (e.g. Sigfox, LoRa)	Licensed Service (e.g. NB-IoT)
Leverages existing network	🔴	🟢
Extended Battery Life	🟢	🟢
Deep Indoor Coverage	🟢	🟢
SIM security for the IoT	🔴	🟢
Experienced Network Support	🔴	🟢
Standards Based (non-proprietary)	🔴	🟢
Bandwidth Available (FOTA)	🟡	🟢
2 Way Communication (FOTA)	🟡	🟢
Low Device Cost	🟢	🟢

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3GPP & Non-3GPP LPWA Technology Comparison

	Sigfox	LoRaWAN	NB-IoT
Modulation	BPSK	CSS	QPSK
Frequency	Unlicensed ISM bands (868 MHz in Europe, 915 MHz in North America, and 433 MHz in Asia) 100 Hz	Unlicensed ISM bands (868 MHz in Europe, 915 MHz in North America, and 433 MHz in Asia) 250 kHz and 125 kHz	Licensed LTE frequency bands
Bandwidth	100 Hz	125 kHz - 500 Khz	180 kHz
Max. Coupling Loss (MCL)	153 dB	157 dB	164 dB
Maximum data rate UL	100 bps	300bps - 38.4kbps	200 kbps
Maximum data rate DL	600 bps	300bps - 38.4kbps	200 kbps
Bidirectional	Limited / Half-duplex	Yes / Half-duplex	Yes / Half-duplex Unlimited
Duty Cycle Restriction	Yes (0,1%-1% in EU)	Yes (0,1%-1% in EU)	No
Maximum messages/day	140 (UL), 4 (DL) 50,000(BTS)	50,000(BTS)	Unlimited
Maximum payload length Range	12 bytes (UL), 8 bytes (DL)	243 bytes	1600 bytes
Typical Downlink Daily Throughput	24 Bytes	~ 200 Bytes	Limited only by battery power
Typical Uplink Daily Throughput	1.64 Kbytes	~ 200 Kbytes	Limited only by battery power
Range	10 km (urban), 40 km (rural)	2-5 km (urban), 15 km (rural)	2-3 km (urban), 15 km (rural)
Interference immunity	Very high	Very high	Low
Authentication & encryption	Not supported	Yes (AES 128b)	Yes (LTE encryption)
Adaptive data rate	No	Yes	Yes
Handover	End-devices do not join a single base station	End-devices do not join a single base station	End-devices join a single base station
Localization	Yes (RSSI)	Yes (TDOA)	Yes (OTDOA in 3GPP rel. 14)
Allow private network	No	Yes	No
Standardization	Sigfox company is collaborating with ETSI on the standardization of Sigfox-based network	LoRa-Alliance	3GPP

Note :

Duty Cycle
the duty cycle (percentage of time on–air) and dwell time (maximum length of time on air in a continuous burst) will both be constrained e.g. 30 seconds in a day

License Frequency
Interference immunity
Protected by government
Has QoS

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IoT market fueled by trends with great value expected…

Connected device technology advancing with more powerful and adaptive HW such as beacons and sensors

Tech players, Telcos, and VC's are increasingly active in IoT

Machine learning rapidly advancing

"Prescriptive analytics" paves way for autonomous, closed-loop systems

Cost effectiveness and efficiency	Achieve cost savings and operational efficiency through remote monitoring and control, auto-optimization and real time response
Business model innovation	Leverage data collected for analytics to devise new revenue models and create new customer value
Immersive and enriched customer experience	Providing immersive & enriched user experience by supporting human-machine interface with digital info
Ecosystem (partnership)	Building required collaboration models to utilize various data and create business models that better serve target customers

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... which in turn is enabling a new set of business models

From selling smart products, to services, to selling outcomes

	Product based	Service based		Outcome based
Description	**Selling smart, connected products**	**Selling products** *and/or* **services/apps**	**Selling platform as a service**	**Selling results**
Pricing	• Pricing based on value services	• Pricing based on value of subscription	• Pricing based on usage,	• Pricing based on results from product
Expenditure type	•	CAPEX results subscription or service	• OPEX based cost of	• OPEX based usage • OPEX based
Selling process	• One-time transaction, SLA), from self-serve to	• Requires contract (e.g. typically high touch high touch	• Requires contract, understanding of needs	• Very high touch, deep typically low touch
Examples (KAESER KOMPRESSOREN)	• Offers air compressors for	• Offers preventive maintenance using IoT	• N/A	• Using sensors, sells air fixed price by usage
Examples (GE)	Offers smart machinery	• GE offers analytics, security, etc. on top of Predix	• Predix platform priced by usage	• GE sells jet engines by uptime hours and thrust

Offers smart machinery

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How we Progress

Focus to Digitizing Marketing, Analytics and Processes

Telkomsel has developed and continue to improve its digital service in order to differentiate from competitors

Bundled Entertainment
- TELKOMSEL DIGITAL LIFESTYLE
- DUNIA GAMES (duniagames.co.id)
- langit musik
- #JAJANONLINE (tsel.me/jajanonline)
- MAXSTREAM
- TELKOMSEL VIDEOMAX

FINTECH
- t cash
- NFC
- t cash Ekstra

Advertising & Big Data
- TELKOMSEL Digital Advertising
- mobile coupon
- eKado
- M SIGHT (Mobile Consumer Insight)

IoT & M2M
- TELKOMSEL iot Control Center
- TELKOMSEL FleetSight
- TOMS
- TELKOMSEL INTANK (Intelligent Tank Monitoring System)

New Services
- API (Application Programming Interface)
- VoLTE
- Rich Communication Suite
- TELKOMSEL NB-iot

Digital Consumers product with potential bundled offering and increase stickiness to telco services

Digital B2B , which focus on specific verticals industry

New sources of growth

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Telkomsel is focusing to grow IoT and Driving the Ecosystem for the Future

We aim to help enterprises grow their business by delivering IoT technology and solution.

Smart Enabler

Enabling Connectivity Management with IoT Control Center

- Platform based services for controlling and managing customer devices and onnectivity
- Technology enablement with the latest technology for multiple use cases (2G, 3G, 4G, NBioT)
- Enabling data insight/analytics as a service for Customers

Build Verticals

Build & Grow End-To-End Solution on Selected Verticals

- Start with focusing on automotive/ transportation, exploring other setting in asset management, cities, etc
- Collaborate with customer to discover and address pain points in eficiency, productivity, safety, etc.

Driving IoT Ecosystem

Collaborate through partnership End-To-End Solution on Selected Verticals

- Collaborate with partners and local start ups to drive innovation & competencies through IoT Innovation Lab (services, platform, devices)
- Exploring & experimenting potential areas in cities, aquaculture, agriculture, etc.

Telkomsel IoT Journey … Concept to Commercialization

2014 **2015** **2016** **2017** **2018**

2014 — IoT Control Center

IOT Platform Live
Join cooperation with Jasper (Now Cisco Jasper To Provide Integrated IoT Platform).

API

Full Control
Activate, Deactivate SIMS, Rule Capability

API Capability
Create and integrate API.

2015 — T-Drive

T-Drive
Vehicle Tracking with OBD-II Technologies.

IoT Managed Service Connectivity

99.5% SLA
24/7 Monitoring & Management

Opex Based Model

High security – End2end IPSEC 256 bit AES

Response problem handling in **4 hours**

IoT Control Center 2.0

2016 — T-Bike

T-Bike
Motorcycle Tracking with engine on-off features

MOTORPLUS
Best Motorcycle Tracker

MURI
Fastest Installation Of GPS Tracker

2017 — FleetSight

FleetSight
solution-centric fleet management services focusing on vehicle telematics.

Nation-wide Technical Support

TOMS Adjacencies
Workforce

ERICSSON
DCP & eSIM
2nd Platform

2018

NB-IOT PROMO PACKAGE OFFER
IDR 15K Per year

Launched The First Commercial Nb-IoT Network in Indonesia (Jul-2018)

The First Commercial Commercial Electric Meter In South East Asia (Oct-2018)

INTANK
Intelligent Tank Monitoring System

Asset Management

Single Connectivity Management Platform for many use cases

Networks

- CAT-M1
- NB-IoT
- 2G
- 3G
- LTE

Deep Network Integrations

CISCO Jasper
Control Center

Core Capabilities

Lifecycle AUTOMATION	Monitoring & DIAGNOSTICS	Comprehensive SECURITY
COST Management	Operational ANALYTICS	Back-end INTEGRATION

Global API

Intuitive UI

Use Cases

- Smart City
- Connected Vehicle
- Connected Living
- Connected Industry

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Enterprise Federation

- LPWAN supported on Control Center for both LTE-M and NB-IoT access technologies

City of Barcelona

| Devices | Data Mngr | Billing | Admin | Insight | Automation | Onboarding | Support | Reports | Resources |

▼ Departments

Smart Water Meters

Smart Parking

Smart Bikes

City Cameras

City Lights

Alerts

Reports

Smart Water Meters   February 2017 ⌄

NUMBER OF DEVICES IN SERVICE

Current Month: **51K**
6 Months Average: **39K**

AVG. DAILY SESSIONS PER DEVICE

Current Month: **4.5**
6 Months Average: **2**

NUMBER OF EVENTS

Current Month: **9.3M**
6 Months Average: **4.6M**

NONRESPONSE RATE

Current Month: **3.5%**
6 Months Average: **5.1%**

Average Daily Sessions

6 Months View ⌄

— ● — Avg. daily sessions triggered per device
——— Avg. sessions of last 6 months
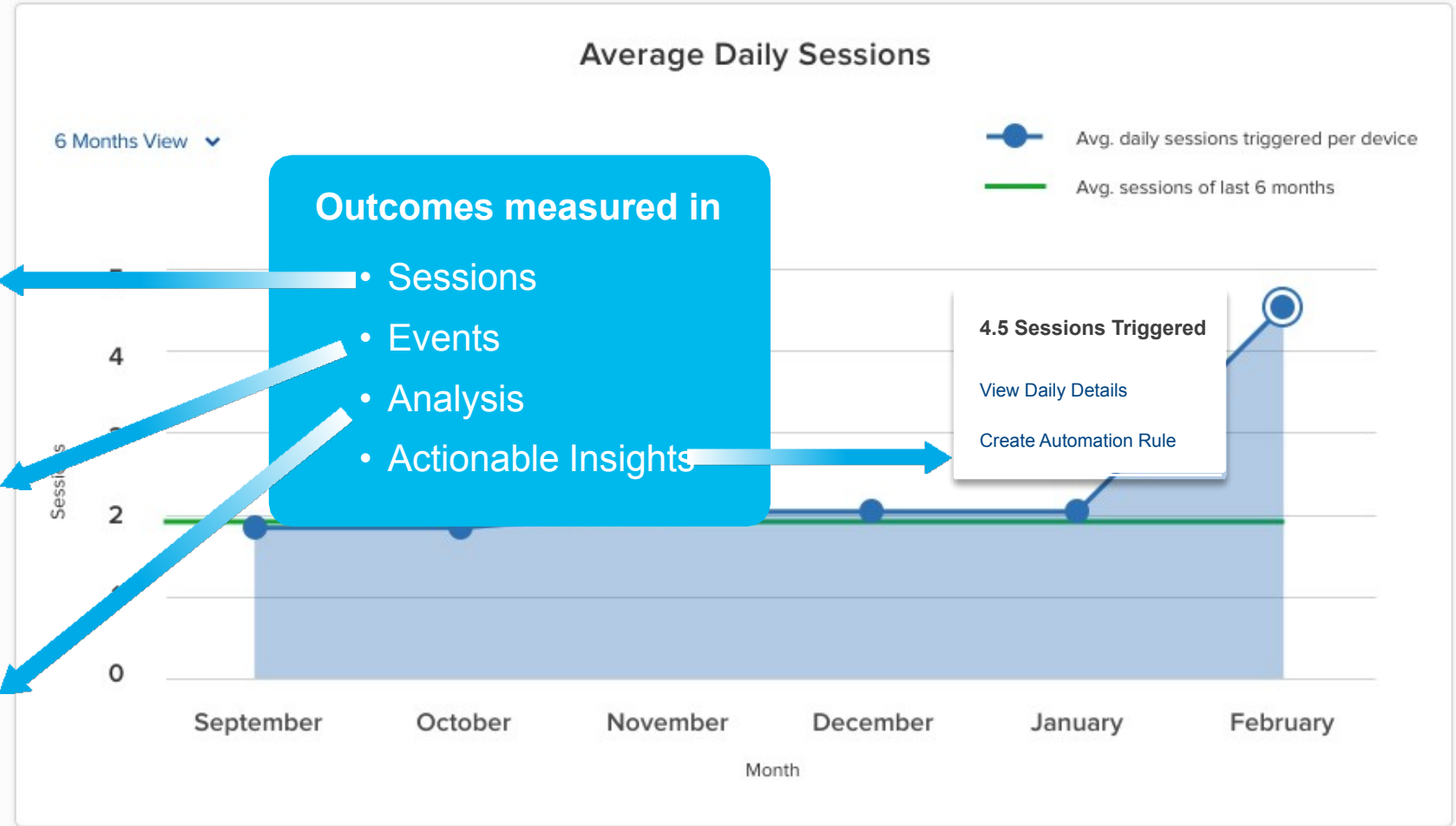
Outcomes measured in

- Sessions
- Events
- Analysis
- Actionable Insights

4.5 Sessions Triggered

View Daily Details

Create Automation Rule

Sessions

4

2

0

September   October   November   December   January   February

Month

Telkomsel IoT

Bringing **IOT innovations** to improve productivity, efficiency and business performances

Business Enabler

Telkomsel Control Center

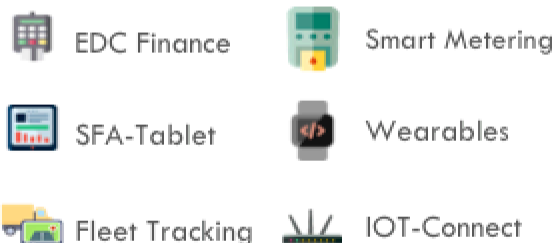2G/3G/4G enabled, location info enabled, real time dashboard, alert system.

- EDC Finance
- SFA-Tablet
- Fleet Tracking
- Smart Metering
- Wearables
- IOT-Connect

600K Connections

200+ Enterprises

BANK BRI · BCA · Schlumberger · SUPERSPRING

PERTAMINA · ICON+ · ENERREN technologies

Solution Provider

Telkomsel Fleet management

Telkomsel Order Management System

Telkomsel Remote Tank Monitoring

1000+ Connections

10+ Enterprises

momobil · DAIHATSU PT. Astra Daihatsu Motor

PAMA · kisel · HokBen · TL
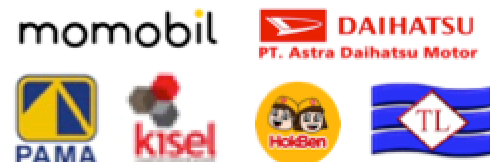
Technology Enabler

NB-IoT **E-SIM*** **LPWAN**

1. First Telco in Indonesia to launch NB-IoT services

2. Enable application that require low data consumption & low battery consumption with NB-IoT

3. NB-IoT provides carrier grade QoS that offers more secure & more reliable wireless connection

4 use cases

4 Enterprises

Spekun by bik · Automatic Fish Feeder · Smart Metering

IoT Innovation Lab

Build a **minimum viable ecosystem** to support the IoT business incubation

Becomes the largest accelerator hub for Indonesian innovators to develop innovative solutions through mentoring, funding, research and partnership with Telkomsel.

Connecting Customer, Technology Provider & Solution Provider to be able to collaborate and form a partnership to grow IoT business
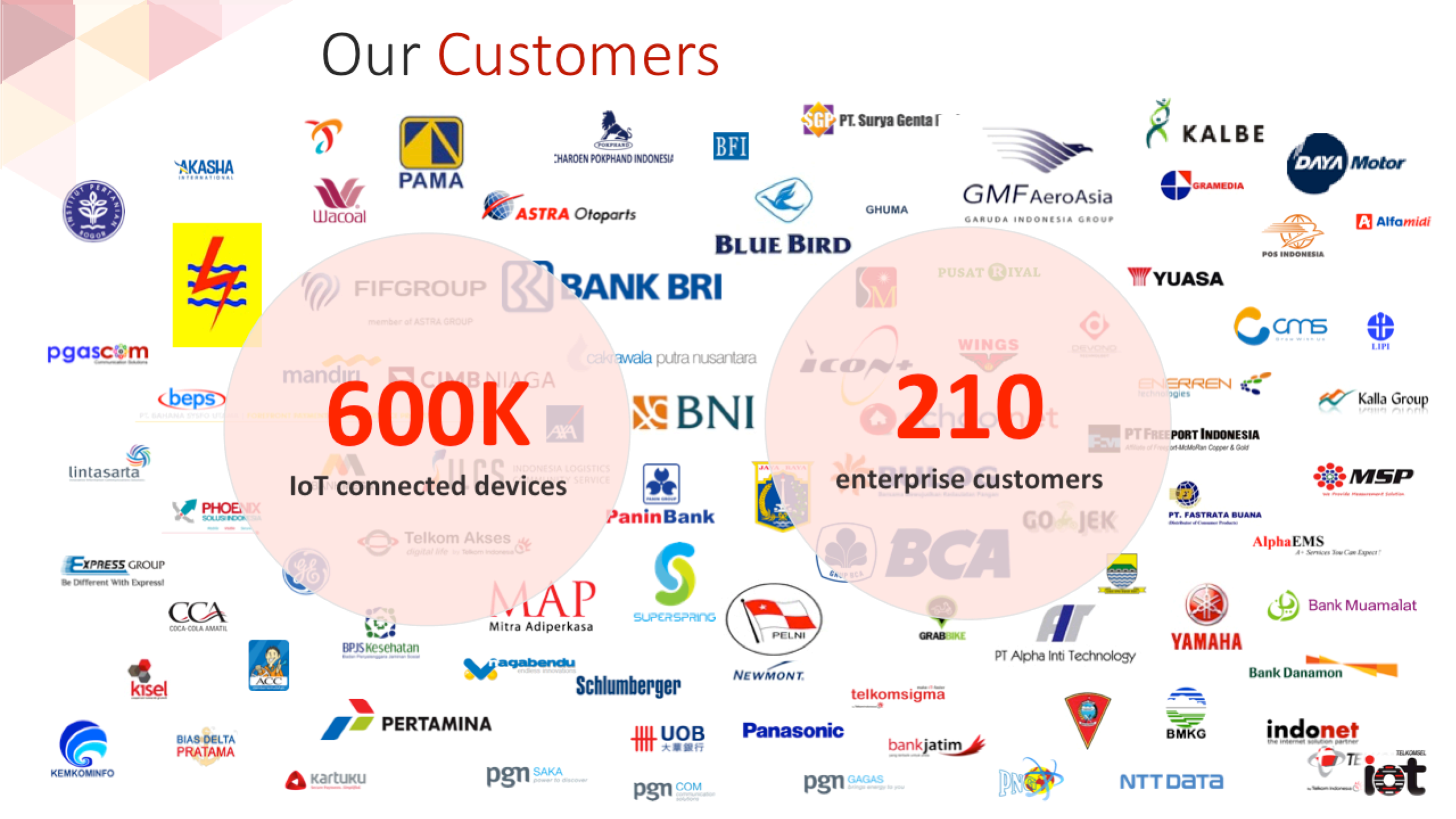
3 Startups

4 use cases

BANOPOLIS · Parkirin

mySmash · eFishery · TELKOMSEL

Our Customers

600K IoT connected devices

210 enterprise customers

Customer Problem need to be solve compherensively

Customer need not only IoT but also other solution to solve their problem.

Role	**iot** TELKOMSEL Providing IoT Solution • NB-IoT/4G&eSIM • Platform • Device & Apps	Consumer **cash** MAXSTREAM · langitmusik Payment Solution for Life Sytle and Micro Segment	TELKOMSEL **Digital Advertising** Big Data for customer segment and SMS Targeting to promote their own product	**<DigiHub/>** Telkomsel Voice & SMS API to connect with Apps	**M** TELKOMSEL **SIGHT** SURVEY Big Data for customer segment and
OEM	✔	✔	✔		
AGRI-1	✔	✔	✔	✔	✔
RIDE HAILING	✔		✔		
FMCG	✔	✔	✔	✔	✔

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Telkomsel TINC (Telkomsel Innovation Center) with the release of first NB-IoT Lab in Bandung, as a platform for IoT startups, developers, and system integrators to collaborate with related stakeholders and to inspire & create vertical solutions for making Indonesia Industry 4.0

Innovation Center

Telkomsel IoT Lab

NB-IoT Devkit

We building partnership to bringing and provide most latest EVB, module & devkit as support tools in the Iot Lab, with device player like :
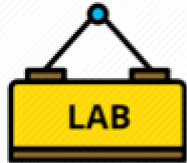
- Simcomm
- Quectel
- Ublox

1st phase: 50 devkit & 50 chipset per brand

Lab Space

- **Bandung** will be **main Lab Space** and act as connector to Developer community (**DevHub**)
- **Jakarta** Lab will be positioned as **business hub** to ensure that supply and demand on solution can meet their needed.
- **Surabaya** Lab is positioned as the gateway to broader market in eastern Indonesia (**gatehub**)
- **Campus (UI & ITB) : as Research Hub**

LAB

Funding Access

- Incubation Program
- Business Accelerators

Connectivity

- GSM – 2G/3G
- 4G LTE
- LPWAN -- 1st Phase : NB-IoT

Platform

Partnering with leading Indonesia IoT platform player to brings ready-to-scale solution :

- Microsoft Azure
- IBM Watson
- Cisco Jasper - Kinetics
- Telkom Antares

iot TELKOMSEL

VALUE WE OFFER

170+ million Customers

Engagement to real customers

Funding Access

Mentorship for technical and business

Nationwide carrier grade coverage

iot Lab

Ideal Space for testing

LAB

Best Connectivity & Technology Readiness

Speed up the validation process

In the Nutshell,

- Internet of Things is still at the early stage, true especially for Indonesia case

- Key stakeholder must do collaboration to work together to accelerate the scale and to firm the business model

- Telkomsel is eager to collaborate with partner and with customer to build strong use cases that benefit to all parties

- Telkomsel continuous to embrace the technology trend going forward

Please Contact Us

https://telkomseliot.com/en

Telkomsel IoT Smart Connectivity

https://telkomseliot.com/fleetsight

Telkomsel IoT
Information Technology and Services · DKI Jakarta, DKI Jakarta · 32 followers

Following

Any Questions?