

# TELKOM SMART CITY FRAMEWORK FOR INDONESIA SMART CITY INITIATIVE (PRACTICAL STUDY PT TELKOM INDONESIA)

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## Abstract

Smart City has become a major program in a few cities in the world even in Indonesia alone. In the country, the local government in cities and districts begin to improve it to make the city into a smart city, a city that feels safe, comfortable and can give service that required by citizens with fast, easy access to services and sustainable. To support the fulfilment of the local government in realizing the smart city, Telkom as one of The Indonesia's largest Telco Company has efforts to the initiative through the Telkom Smart City (TSC) Framework. TSC aims to provide solutions to local governments with appropriate local content and is characterized by shades that are owned by their respective regions. This study was conducted to assess the Telkom Smart City Framework for Indonesia Smart City Initiative with Desk Research method of collecting relevant information from the internal and external organization.

## Introduction

The development of the rapidly changing digital world and have changed the way people live, especially in urban areas. All generations of the young to the elderly as has become imperative to have a Smartphone to interact with friends, family, relatives and communities through access to the Internet wherever they are. Now all activities can be completed quickly, easily and inexpensively by using digital technology. To meet these demands we need a solution that can address the needs of society. On the other hand, people's lifestyles are changing provide an opportunity for business people. They offer a variety of applications that provide convenience and speed to support the activities and daily living needs.

According to sources from Wearesocial.com, a social marketing agency, which issues an annual report as the number of users of the website, mobile, and social media from around the world, the digital world Indonesian development data for 2015 are active users of the internet for 72.7 million, 72 million active users of social media, with 62 users to access social media using mobile devices, and 308.2 million mobile phone users. In addition, based on the report also revealed that Facebook is still the social media that is most widely used in Indonesia. Then Chat application

WhatsApp become the most favoured population of the country.

Based on the research of ASEAN DNA, Indonesia occupied the 6th position with the fastest internet access country in Asia. The average internet speed in Indonesia is still lower than Malaysia and Singapore. The number of Internet users 40% of the total population and ranks 6th in the world. 90% use social media [1].

The United Nations predicts a near doubling of city dwellers by 2050. The global population will increase from 7 billion to 9 billion, the UN forecasts, with the urban population to grow between 2.5 billion and 3 billion people in the next 30 years. Preparing for the population growth opens significant opportunities for economic growth but also creates many challenges that municipalities need to address, including: high cost of living, increased crime rates, massive investments in infrastructure, exponential growth of data and potential cultural clashes [2].

In the government sector both local and central, there are demands on public services are perceived is still slow, not transparent, and the procedure is complicated. To provide an adequate solution and can be easily accessed by the public, and is integrated one-stop service, the local government in several cities in Indonesia have started to initiate to apply the concept of the smart city.

By applying the concept of smart cities, local governments are very confident that it can solve the problems that exist in the city. A city is said to be smart if the city really can know the state of the city in it, to understand these issues more deeply, to be able to take action against the problem.

To support the fulfilment of the local government in realizing the smart city, Telkom has efforts to the initiative through the Telkom Smart City Framework, to provide solutions to local governments with appropriate local content and is characterized by shades that are owned by their respective regions.

## Literature Review

### A. Smart City Concept

Smart City is about supporting cities, districts, or regions in fulfilling some of their key missions by the support of ICT with Smart and Intelligent solutions and technology such as:

- Providing New Services;
- Optimizing Existing Services;
- Allowing savings on key limited resources (energy, water, space, etc);
- Enhancing the relationship between the city and its citizens including business and tourists [3].

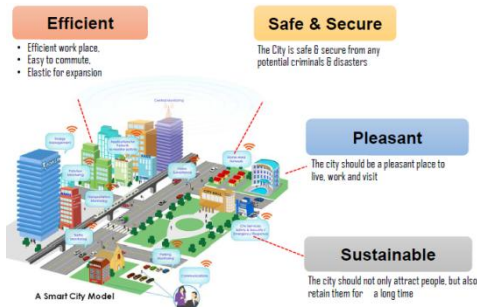


Figure 1. Smart City Citizen’s Expectation [4]

A Smart city is a smart city concept designed to help things community activities held, especially in the effort to manage the available resources efficiently and provide easy access to information to the public, up to anticipate unforeseen events.

Table 1. Smart City Concept Comparison

Definition	Main Aspects
Smart City Nusantara is “A concept that the utilization of ICT solutions in the development and management of a city or region with the aim to improve work skills and government performance so that government can provide sustainable services with an effective process and improve the comfort and security of city life and prioritize local wisdom”,(Telkom Indonesia, 2016).	- Smart Government - Local Wisdom
Smart City as “A means to enhance the life quality of citizen has been gaining increasing importance in the agendas of policy makers. However, a shared definition of Smart City is not available and it is hard to identify common global trends”,(Neirotti P et al)[5].	Policy makers aspect.
“Smart city, the important strategy of IBM, mainly focuses on applying the next-generation information technology to all walks of life, embedding sensors and equipment to hospitals, power grids, railways, bridges, tunnels, roads, buildings, water systems, dams, oil and gas pipelines and other objects in every corner of the world, and forming the “Internet of Things” via the Internet” [6].	The technological aspect
“A city well performing in a forward-	The collaboration of 6

Definition	Main Aspects
looking way in economy, people, governance, mobility, environment, and living, built on the smart combination of endowments and activities of self-decisive, independent, and aware citizens”, (Giffinger, 2007)[7].	aspects are economy, people, governance, mobility, environment and living.
“A city that monitors and integrates conditions of all of its critical infrastructures, including roads, bridges, tunnels, rails, subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens” [8].	The integration of infrastructure and systems.
“Connecting the physical infrastructure, the IT infrastructure, the social infrastructure, and the business infrastructure to leverage the collective intelligence of the city (Harrison et al, 2010)” [9].	All main aspects of a smart city.
A smart city is “. . . a city which invests in ICT enhanced governance and participatory processes to define appropriate public service and transportation investments that can ensure sustainable socio-economic development, enhanced quality-of-life, and intelligent management of natural resources” [10].	Enhanced quality of life

Among the big stakeholders, the initiatives are usually stressing a number of specific urban features, like in:

Table 2. Smart City Initiative

No.	Provider	Initiative	Specific Urban Features
1.	IBM	Smarter Cities	ICT, data analytics, cloud computing, intelligent platforms
2.	Cisco	Smart + Connected Communities	ICT, networking equipment, internet of things
3.	GSMA	Mobile Cities	ICT, mobile networks, smart applications
4.	SmartCity Planning Corporation, Inc.	Green Cities	Planning, Energy, Software
5.	Siemens	Sustainable Cities	Energy, Transportation, Water, Waste, Healthcare
6.	Microsoft	CityNext	ICT, Software, Cloud, Big Data

In another sense, Smart City is defined as a concept of the development and management of the city with the use of Information and Communication Technology (ICT) to connect, monitor, and control a variety of resources that exist within cities with more effective and fuel-efficient to maximize service to its citizens and to support development sus-

tainable. Based on these definitions, there are three things to be underlined related to smart city, namely:

- A concept that is implemented by the local government system in managing urban communities.
- Requires local management to all resources effectively and efficiently.
- Smart city is expected to run the proper functioning of the correct information to the public and able to anticipate unexpected events.

Frost & Sullivan identifies eight major aspects of the application of smart city, namely smart governance, smart infrastructure, smart technology, smart mobility, smart healthcare, smart energy, smart building and smart citizen. Almost all the capital and major cities have implemented the Smart city program, both cities in Asian countries, Europe, America, and even to Africa.

The IESE Business School, a Spanish study has selected 20 of the best smart city in the world. They vote through an index called Cities in Motion Index (CIMI), by sending investigators to 181 cities in 55 countries around the world and measure it with 77 indicators. 20 smart cities best the world according to CIMI, namely Tokyo, London, New York, Zurich, Paris, Geneva, Basel, Osaka, Seoul, Oslo, Philadelphia, Los Angeles, Dallas, Copenhagen, Eindhoven, Amsterdam, Sydney, Stockholm, Chicago, and Baltimore.

Compared to the 20 countries above, the cities in Indonesia said late in implementing smart city, so it is still far from achievement, especially large direct impact that can be felt by the community.

Despite that some local governments amid improve itself and seek to increase government services, especially public services, such as by applying a command center. From the room Command Center, town clerk can monitor conditions in real time on the monitor through the use of CCTV in the streets in the city, through the surveillance cameras can know their traffic violations and the crimes committed and recorded by CCTV. From the space, through the application provided the officer may receive complaints of citizens related to social issues, ranging from flooding, congestion, garbage, tourist attractions, an area prone to criminality licensing services and so on.

## B. Smart City Market

According to a Grand View Research Report (February 2018), The global smart cities market size is anticipated to reach USD 2.57 trillion by 2025, at a CAGR of 18.4%. Factors such as growing urban population, need to better manage limited natural resources, and increasing focus on

environmental sustainability are expected to encourage the growth of this market[13].

Market of Smart Governance segment has the greatest number (20.93%), so that Telkom Smart Government considers that a fundamental component in building a Smart City in addition to ICT Infrastructure. Telkom focus on Smart Government as an initial investment in the development of Smart City.

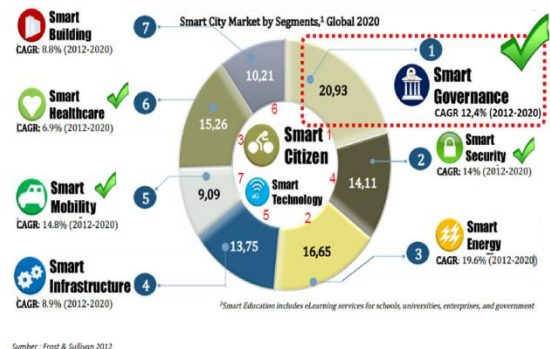


Figure 2. Smart City Market by Segments, Global 2020

For such needs, Telkom made a smart city concept is in accordance with the conditions in Indonesia as a first step in supporting the implementation of the smart city.

The main objective Smart city is to establish a safe and comfortable city for residents as well as to strengthen the competitiveness of the city in terms of economy. So that the purpose of the implementation of the smart city is to support the city in a social dimension (security), economic (competitiveness) and the environment (comfort).

## Smart City Framework

The Smart City Framework describes a process that will help key stakeholders and city/community participants 1) understand how cities operate, 2) define city objectives and stakeholder roles, and 3) understand the role of ICT within physical city assets. The Smart City framework allows the city to set up a standardized system to measure the maturity level of smart cities, and collect city data, and to make it accessible for efficient and effective implementation and management of Smart City's economic, social and environmental solutions [14].

A Smart City Framework provides a detailed view of how cities function and 3 major outcomes are:

- Taxonomy that enables cities to benchmark relevant content based on the hierarchy of physical city components;

- The role of stakeholders that determines who does what, thus creating an understanding of how to implement the Smart City solution;
- Catalogue system of city content that is easily accessible.

These outcomes will enable cities to:

- Customize a Smart City blueprint;
- Identify where and how to implement ICT solutions in cities;
- Enabling private sector participation in smart city projects;
- Conduct a city or region gap analysis that enables cities to benchmark themselves, consistently and accurately;
- Create a structured case study template for collating multiple business models for similar Smart City initiatives.

## Methodology Research

This research is a practical study the Telkom Smart City Framework for Indonesia Smart City Initiative at Telkom Indonesia company. In doing this practical study, the authors use Desk research method.

Desk research is basically involved in collecting data from existing resources. It often regarded as a technique which is cheap compared with the field research when the cost and time become the main thing.

In conducting the Internal Desk Research, the authors get a lot of information from inside the organization as a normal process. While for the External Desk Research, the research conducted by collecting relevant information from outside the organization in Online Desk Research.

## Problem Analysis

Smart City Implementation to become an urgent need for some local governments to make the city into a safe, comfortable and sustainable. To realize the smart city, local government and all stakeholders need to work together to find solutions.

Telkom as a Telco Company with its capability to bridge between the interests of local governments in an effort to give excellent service to the community and the need for the application of the concept of a smart city that is in accordance with the conditions and characteristics of each area.

One of the most significant issues facing Smart City is how to use OpenData and City Data, especially citizen contributed data, to ease new innovative city services.

Pushing OpenData to city websites has certainly opened data for access, but it's still the case that most Open Data are hard to use - partially because of data formats and partially because of the lack of consistent access.

## Telkom Smart City Framework

An Integrated Product & Services provided by TELKOM Group for the Nation that consist Platform of M2M, BigData, Cloud (SaaS / PaaS / IaaS), Connectivity and Devices that cconsisting of 3 pillars: ICT Infrastructure, Integrated City Management, and Smart User.



**Figure 3. Telkom Smart City Framework**

**Table 3. : Strategic Implementation**

Pillar 1 ICT Infrastructure	Pillar 2 Integrated City Management	Pillar 3 Smart Users
Business Strategy: Comparative Strategy	Business Strategy: Coopera- tive Strategy	Business Strat- egy: Competi- tive Strategy
Deployment: Infra- structure connectivity (FTTH and Wi-Fi infrastructure, Device and Data Center).	In cooperation with local governments in developing ICT integrated at the urban ecosystem (Smart Gov., Smart Industry, & Smart Citizen).	Focusing on building Smart Solution

## The 1<sup>st</sup> Pillar (ICT Infrastructure)



Figure 4. Indonesia Digital Network (IDN) 2020

Indonesia ICT Master Plan is a drilling down of “Telematika/ICT” portion of MP3EI, consist of IBP “bone and flash”, a master plan to ensure true broadband infrastructure and experience, and NRI improvement “skin” to ensure great impact of ICT. Telkom is ready with IDN (Indonesia Digital Network) to lead the transformation.

From the infrastructure, Telkom continues to develop Indonesia Digital Network, one of them is to hold the fiber optic network throughout Indonesia. This optical fiber network infrastructure will be the backbone of the development of seven other aspects of the implementation of the smart city.

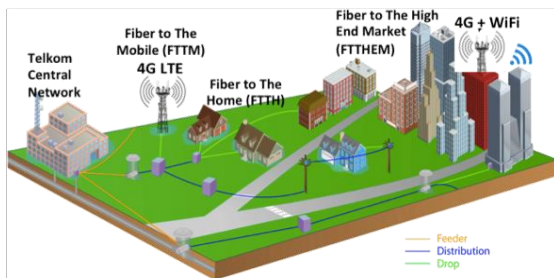


Figure 5. Fixed Broadband (Indihome Service)

To support the development of smart citizen aspect as one important element in the implementation of a smart city, Telkom expands the service area for INDIHOME services using Fiber network. INDIHOME service is an integrated service triple play (home phone, high-speed internet access of up to 100 Mbps and interactive TV) that utilizes fiber network infrastructure. High-speed internet access is prepared to assist citizens in obtaining information quickly and use a variety of applications on the Internet with ease. Interactive TV using IPTV technology is designed to present the concept of edutainment and entertainment shows which still contain a charge of education.

Up to September 2017, Telkomsel has built more than 146,000 BTSs that reach up to 95% of the Indonesian population. Of these, more than 96,000 BTS of which are 4G

and 3G BTS to ensure customers enjoy quality data services [15].

The composition of frequency allocation owned by Telkomsel as follows:

Table 4. The Composition of Frequency Allocation

No.	Frequency	Bandwidth
1.	2.3 GHz	30 MHz
2.	2.1 GHz	15 MHz
3.	1.8 GHz	22.5 MHz
4.	900 MHz	7.5 MHz
5.	800 MHz	7.5 MHz

## The 2<sup>nd</sup> Pillar (Integrated City Management)

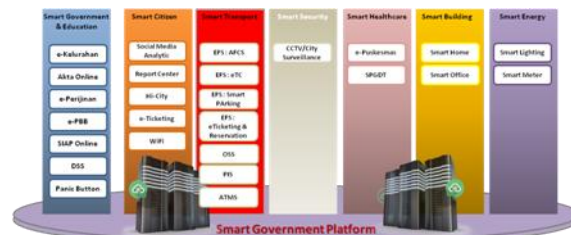


Figure 6. Smart Government Platform

Telkom will prioritize the development of the Smart Government Platform consisting of the entire ecosystem in Pillar-2 in an effort to support Integrated City Management as a foundation for building Smart City.

Telkom also able to adopt capabilities from local partners with standardize Data API to integrate Smart Government Platform.

## The 3<sup>rd</sup> Pillar (Smart User)

Telkom continues to grow the ecosystem of innovation development of a national digital coherent as a solution to various problems in Indonesia. Besides, Telkom also develops the digital business ecosystem and improve the dynamics of the national economy through the development of a creative economy. The Digital business development performed by coach young entrepreneurs digital (startups) through incubation and acceleration patterns. The development of digital innovations carried out in a variety of Digital Valley owned by Telkom in three cities of Bandung, Yogyakarta, and Jakarta. Besides, there are several Digital

Innovation Lounge (DILO) spread across 20 cities in Indonesia, each of which serves as a creative camp.



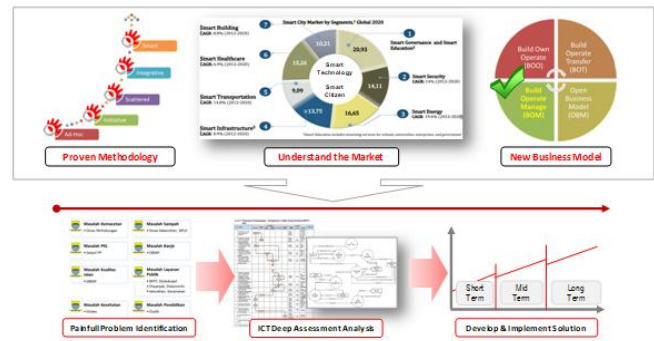
**Figure 7. Cities of the Creative Centers and Creative Camps**

To educate Citizen & Involve Gen-Y be part of Digital Ecosystem Solution Development routinely done also sharing various digital communities, which examines the latest information, inspiration, and best practice. As one form of business acceleration, in this Jakdiva also do mentor and a range of training and coaching. Coherence product development that does by optimizing the various platforms available in the Telkom Group to improve efficiency and product capabilities. For example, by utilizing the cloud, big data analytics, various methods of payment, and customer management.

Telkom held Indigo Program to select the startup featured that done in the incubation and acceleration. From this program, obtained a number of startup digital business potential, as part of the startup has begun incubated and accelerated intensively in the Digital Valley owner by Telkom in Indonesia. Incubation and business acceleration program are implemented in the form of partnership with QuadHelix pattern, involving academia, business, community, and government. Now Telkom has collaborated with various universities, Agency Creative Economy, Ministry of Communication, various other ministries, provincial and municipal governments as well as digital communities, among others Local Startup, Indonesia Digital Creative Industry Community, Founder Institute, Technasia, Internet Marketing Association, Code4Nation, and Volunteers of ICT.

## Telkom Milestone to Build Smart City

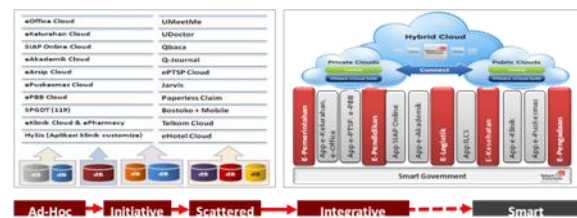
TELKOM is ready to help City by leveraging Telco Capabilities. With proven Methodology for assessing Maturity Level of City, understand very well of the city and new propose of Business Model, TELKOM has prepared 3 milestones approach: Painfull Problem Identification, ICT Deep Assessment Analysis and Develop and Implement Solutions.



**Figure 8. Telkom Milestone**

## Vertical Solutions

For the initial stage, TELKOM can support the maturity of SmartCity city through the preparation of Smart Government Vertical Application Solutions.



**Figure 9. Initial Stage**

## Smart Government and Education

Handle Online Permit Request like Identity Card, Birth Certificate, Family Card, Building Permits etc.) thru e-Administration and e-library provides a collection of papers, journals, articles and reports that are available for reading online or can be downloaded with the goal:

- One Gateway for citizen to apply their permit;
- Easily request any permit from any place at any time;
- Transparency, track the status of request;
- Centralized Document Library with secure access;
- Archive all document and prevent data loss;
- Easily find any document (Land offices to find legitimate Building permits).

### 1) e-Administration

- Dynamic Workflow for Birth Certificate, Identity Card, Family Card;
- Extend new workflow and capability to existing one (Building permits, SLF etc);
- Process Tracking and Monitoring;
- Approval;
- User Notification.

2) **e-Library**

- Find and View document anywhere;
- Manage Document Life Cycle from Create to Destroy;
- Safely store electronic document;
- Easy to search and manage;
- Cross-Department document sharing;
- Securing document access for confidential document.

3) **Directory**

- View interesting Places/Point of Interest in a region to promote tourism;
- View Directory and direction to a place;
- Add new, edit PoI (Point of Interest) & Places on the fly.

## Smart Citizen

Smart Citizen is a platform to generate participatory processes of people (researchers, schools, communities, urban areas and developers etc) in the cities. Connecting data, people and knowledge, the objective of the platform is to serve as a node for building productive and open indicators, and distributed tools, and there after the collective construction of the city for its own inhabitants. [16]

Benefit of Smart Citizen are :

- Social Group, Report Center Apps, Ticket booking, and e-Commerce;
- Goal:
  - a. Provide media for citizen to share their interest;
  - b. Communication and info sharing between user;
  - c. Report any accident/case through social media;
  - d. Sentiment analysis;
  - e. Integrated online ticket booking (ex. Travel, Cinema, Festival).
- Capability - Smart Citizen Portal
  - a. Social Group (Religies, Sport, Hobby)  
Create event, registration, announcement, competition etc.
  - b. Complaint Center
  - c. Report Center  
View all accidents/cases report through dashboard
  - d. Payment Gateway  
1 Place to pay multiple billing (Water, Electricity, tax etc)

## Smart Mobility

The Smart Mobility is a smart city concept that the utilization of ICT solutions in the transportation field with inte-

grated transportation, sustainable, comfortable and secure so it can minimize the social and economic impacts and the potential driving accident caused. This is made possible by less mobility, move freely and less travel time [16].

Benefit of Smart Mobility are:

- Traffic Monitoring, Mobile Device Transportation, and Schedule Tracking
- Goals are Give accurate monitoring for traffic which route to avoid, Give citizen an easy way to find public transportation, Promote better life and income for tax Driver (motor & mobile) and Tracking the schedule of public transportation
- Capability - e-Transportation
  - Transport Order (Taxies, taxibikes)
  - Schedule Tracking
  - Traffic monitoring (Map and traffic checking).

## Smart Healthcare

Smart healthcare is the concept of providing intelligent medical services use ICT technology capabilities through a mobile application (mHealth), e-Health, wearable devices and machine to machine (M2M data) to create time efficiency and cost savings for clinics, hospitals, and community health services effectiveness [17].

Benefit of Smart Healthcare are:

- Turns data into clinical and business insights for better outcomes.
- Hospitals, medical centers and clinicians can work smarter by bringing seamless, patient-centered, holistic and proactive approaches into their interactions with a patient.
- Goal:
  - Deliver better care experiences that emphasize prevention and wellness.
  - quick and smart response for clinician and hospitals.
- Capability - Smart HealthCare
  - Patient can get quick response and easier to administer.
  - Government can map the citizen health.
  - Government can control subsidized budget.

## Smart Building

Smart Building is a concept that uses ICT solutions to control the equipment and building operations such as heating, ventilation, air conditioning, lighting, socket systems, fire safety, surveillance camera systems, access control and other systems automatically using sensors, controls, actua-

tors, and other software to collect data and process them according to their functions and services[18].

Benefit of Smart Building are:

- Land Management and Fire Detection
- Goal:
  - Give accurate data of land ownership (for building management, monitoring etc.)
  - Detect any Fire accident on building to alert Fire Department
  - Parks and Hygiene Department
- Capability - Smart Building
  - 1) Fire Detection
    - Send alert when building detect smoke or excessive heat
    - Fire department can check the building status via CCTV
  - 2) Landscape Management
    - Check the ownership of an area
    - Monitor if a building permit request uses valid area or not
  - 3) Environment Monitoring
    - Know which area is under flood/fire/heavy traffic.

## Smart Energy

Effective energy management and efficient to make the city green and environmentally friendly. Energy management in the city starting from smart building. The responsibility of the manager to build green buildings ecosystems.

Smart Energy to mmetering for Water, Electricity, Gas, and Energy Calculator with goal better oversight and management of energy use and power consumption profile improve energy efficiency.

- Capability – Smart Energy
  - 1) Smart Metering
    - Accurately show the amount of usage
    - Manage energy usage more efficient
  - 2) Energy Calculator
    - View electricity usage per month
    - Know the detailed consumption of electricity

## Conclusions

With the Telkom capabilities for the Smart City development and existence some demand solution based on the local government, the Telkom Smart City solutions can be offered to Local government.

Alternative solutions for the development of Smart City:

- Telkom develops Smart City solutions in one of the cities will serve as a pilot project to be developed in other cities in Indonesia. The Smart City program

must be in line with the roadmap for the development of The Smart City Telkom Group in the future.

- Synergy with 3rd parties or startups for the development of vertical applications to continue to develop and run the Smart City business forward.
- The Solution offered Smart City project based on the local government jointly with relevant units or subsidiaries. This approach will support the Smart City implementation conducted by Telkom.

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