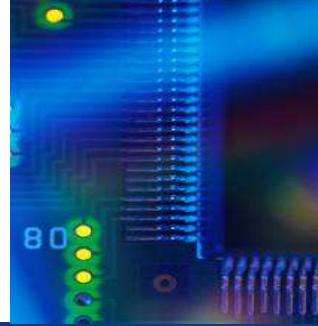




KEMENTERIAN KOMUNIKASI DAN INFORMATIKA
REPUBLIK INDONESIA
Mewujudkan Masyarakat Informasi Indonesia





JUNIOR MOBILE PROGRAMMER

Menentukan Mobile Seluler Network





Deskripsi Singkat

Deskripsi Singkat mengenai Topik
Topik ini menjelaskan mobile cellular network, menunjukkan Desain dari hardware sensor yang ada pada teknologi mobile computing, mengidentifikasi protocol dan fitur-fitur pada mobile cellular network, menjelaskan arsitektur GSM pada mobile cellular network dan menunjukkan aspek security pada mobile sensor

Tujuan Pelatihan
Setelah pertemuan selesai peserta pelatihan mampu :

1. Menjelaskan mobile cellular network
2. Menunjukkan Desain dari hardware sensor yang ada pada teknologi mobile computing
3. Mengidentifikasi protocol dan fitur-fitur pada mobile cellular network
4. Menjelaskan arsitektur GSM pada mobile cellular network

Materi Yang akan disampaikan:

1. Mobile Cellular Network
2. Protokol dan Fitur-fitur pada Mobile Cellular Network
3. Arsitektur GSM pada Mobile Cellular Network
4. Mobile Phone Network
5. Proses- Proses pada Mobile IP Concept

Mobile Cellular Network

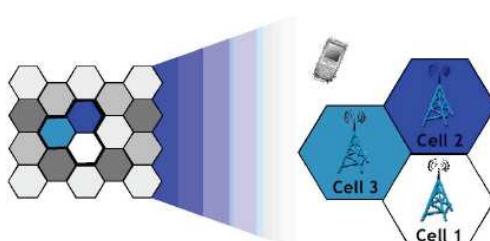
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Materi 1

Mobile Cellular Network

Mobile Cellular Network

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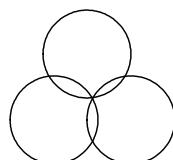
- ❖ **Cellular network** atau **Mobile network** merupakan jaringan nirkabel yang didistribusikan melalui suatu area yang disebut dengan cell bagi semua perangkat yang bersifat bergerak.
- ❖ Daerah layanannya dibagi-bagi menjadi daerah yang kecil-kecil yang disebut Sel (Cell).
- ❖ Sifat: Pelanggan mampu bergerak secara bebas di dalam area layanan tanpa terjadi pemutusan hubungan.

Mobile Cellular Network

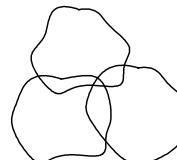
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CELL (SEL)

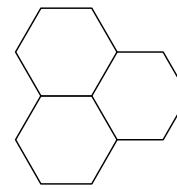
- ❖ **Definisi:** Area cakupan (coverage area) dari Radio Base Station.
- ❖ **Ukuran Sel:** Macrocell (>5km), Microcell (3-5km), Picocell(<1 km).
- ❖ **Konsep bentuk sel dalam perencanaan :** Sel berbentuk heksagonal (atau bentuk yang lain) hanya digunakan untuk mempermudah penggambaran pada layout perencanaan.



SEL IDEAL



SEL REAL

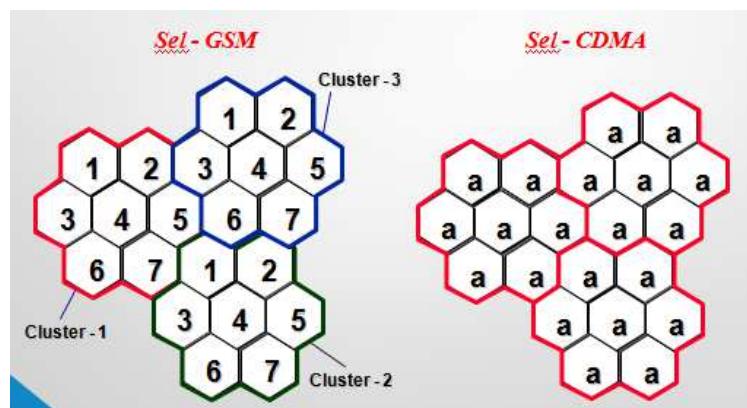


SEL MODEL

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Contoh Konsep Perbandingan Sel:



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Mobile Cellular Network menawarkan beberapa fitur antara lain :

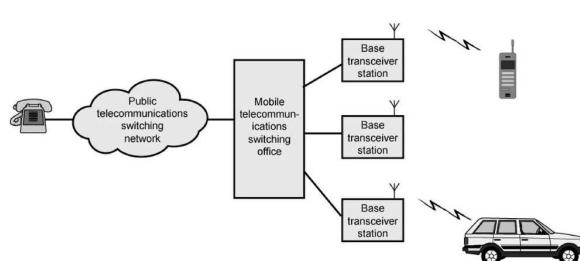
1. Kapasitasnya lebih besar dibandingkan dengan sistem pemancar besar tunggal
2. Menggunakan daya lebih sedikit dibandingkan dengan sistem pemancar tunggal
3. Area cakupan lebih luas dibandingkan dengan sistem pemancar terestrial tunggal
4. Memiliki mekanisme kunci yang memungkinkan komunikasi tidak terputus saat pengguna bergerak menuju cell atau area lain dalam jaringan.

Mobile Cellular Network

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Komponen – Komponen dalam Jaringan Seluler Bergerak adalah :

1. Public Telecommunication Switching Network (PSTN)
2. Mobile Switching Center (MSC)
3. Base Station (BTS)
4. Mobile Station (MS)





Mobile Cellular Network

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Evolusi Mobile Seluler Berdasarkan Generasi

1G → AMPS (Advanced Mobile Phone Service)

2G → GSM (Global System for Mobile Communication)

2.5G → GPRS (General Packet Radio Services)

2.75G → EDGE (Enhanced Data rates for GSM Evolution)

3G → EVDO (Evolution Data Optimized)

3.5G → HSDPA (High Speed Downlink Packet Access)

3.75G → HSUPA (High Speed Uplink Packet Access)

4G → LTE (Long Term Evolution)



Mobile Cellular Network

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Technology	1G	2G/2.5G	3G	4G	5G
Deployment	1970/1984	1980/1999	1990/2002	2000/2010	2014/2015
Bandwidth	2kbps	14-64kbps	2mbps	200mbps	>1gbps
Technology	Analog cellular	Digital cellular	Broadbandwidth/cdma/ip technology	Unified ip & seamless combo of LAN/WAN /WLAN/PAN	4G+WWW
Service	Mobile telephony	Digital voice,short messaging	Integrated high quality audio, video & data	Dynamic information access, variable devices	Dynamic information access, variable devices with AI capabilities
Multiplexing	FDMA	TDMA/CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit/circuit for access network & air interface	Packet except for air interface	All packet	All packet
Core network	PSTN	PSTN	Packet network	Internet	Internet
Handoff	Horizontal	Horizontal	Horizontal	Horizontal&Vertical	Horizontal&Vertical

Mobile Cellular Network

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1G

- ❖ Merupakan generasi pertama yang digunakan pada ponsel klasik – “brick phones” dan “bag phones” – sebelum hadirnya smartphone.
- ❖ Jaringan 1G merupakan sinyal radio yang ditransmisikan secara analog sehingga hanya digunakan untuk telepon dalam bentuk suara
- ❖ Kecepatannya hanya mencapai 2,4 kbps
- ❖ Contoh: Analog Mobile Phone System (AMPS), TACS

Licensed Spectrum
Cleared spectrum for exclusive use by mobile technologies

Frequency Reuse
Reusing frequencies without interference through geographical separation

Mobile Network
Coordinated network for seamless access and seamless mobility

Operator-deployed **base stations** provide access for subscribers

Neighboring **cells** operate on different frequencies to avoid interference

Integrated, transparent **backhaul network** provides seamless access

Mobile Cellular Network

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Keterbatasan 1G

Limited Capacity
Analog transmissions are inefficient at using limited spectrum

Frequency Division Multiple Access (FDMA)*
Large frequency gap required between users to avoid interference

Support for only 1 user (analog phone call) per channel

Limited Scalability
Analog devices are large/heavy, power inefficient, and high cost

Mobile Cellular Network

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2G

- ❖ Contoh: D-AMPS, GSM
- ❖ Diperuntukkan pada ponsel digital

More Voice Capacity

Digital transmissions enable compressed voice and multiplexing multiple users per channel

Uncompressed Voice Signal
64 kb per second

Voice Encoder (Vocoder)

Compressed Voice Signal
8 kb per second

Time Division Multiple Access (TDMA)

Allows multiple users per radio channel with each user talking one at a time

Scalable Technology

Digital components cost/weight far less plus deliver more secure signal

(pocket-sized)

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2G CDMA

CDMA enables users to share the same frequency and communicate at the same time

At the Transmitter

User A

User B

User C

Spread using Code A

Spread using Code B

Spread using Code C

+

User A

User B

User C

+

Code Division Multiple Access (CDMA)

Multiple users can talk at same time using different languages ("codes")

At the Receiver

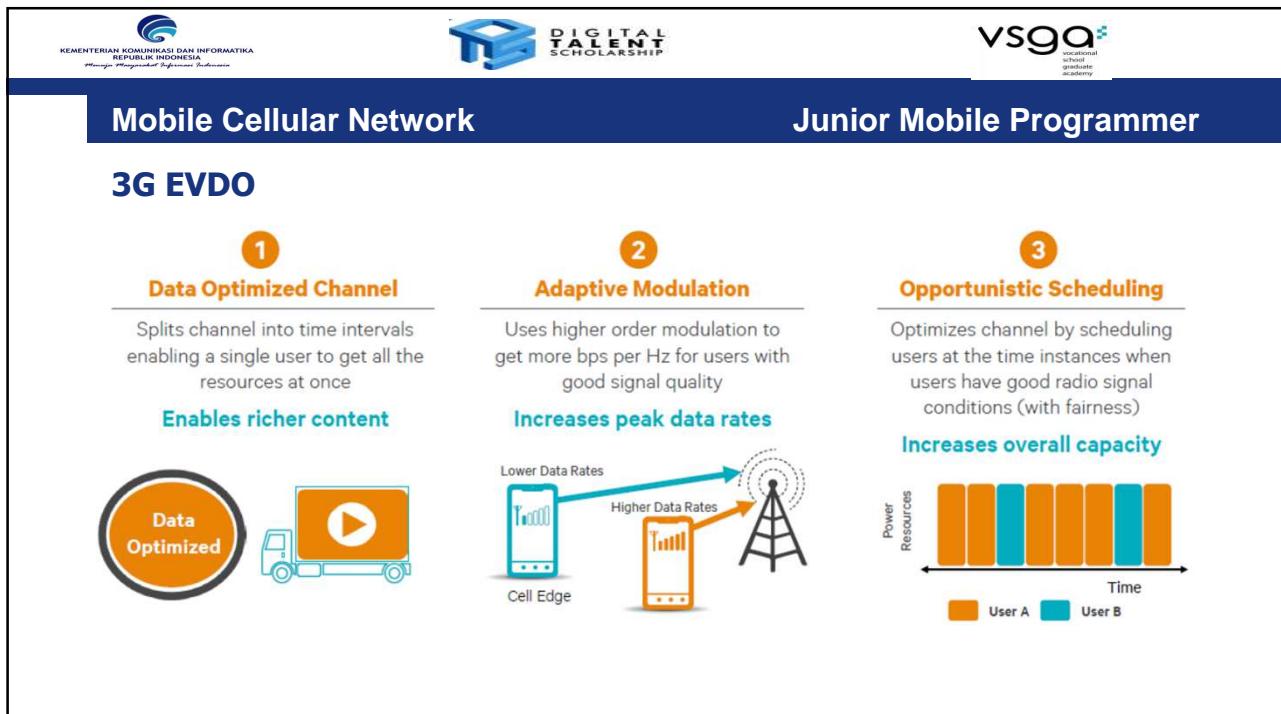
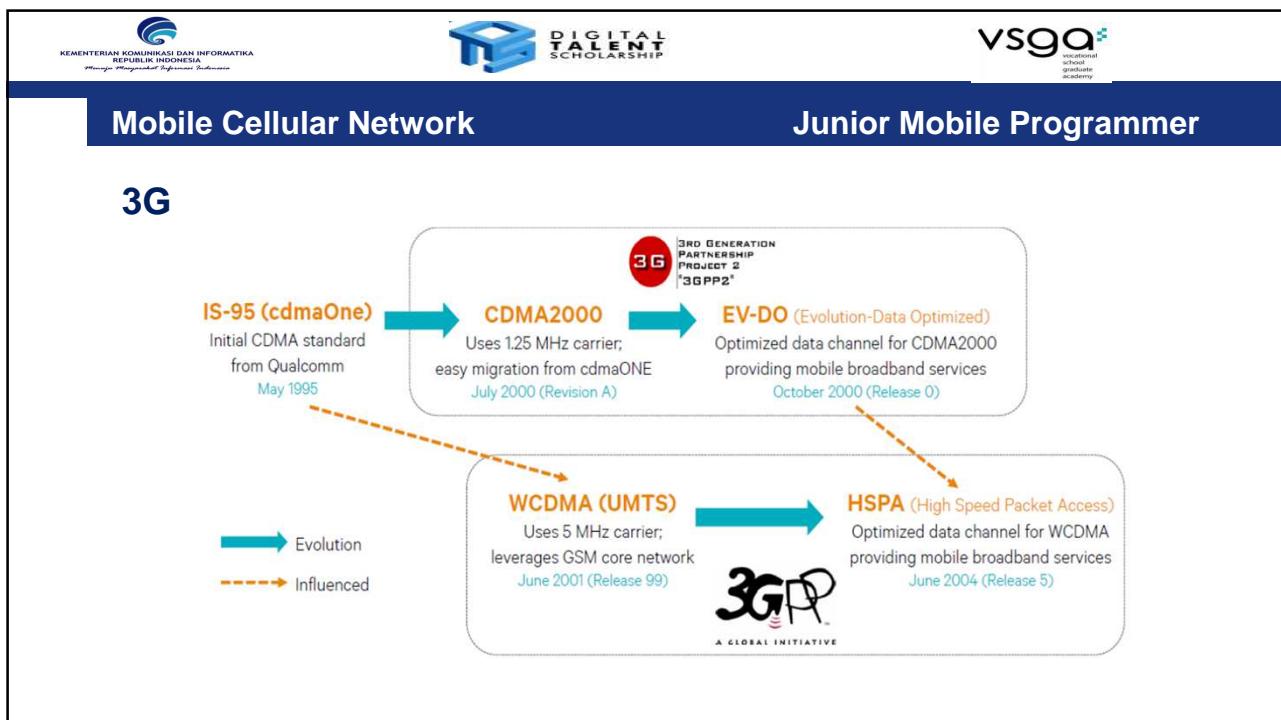
Reconstruct using Code A

Reconstruct using Code B

Reconstruct using Code C

Other signals look like noise

1.25 MHz



The diagram illustrates two mobile cellular network technologies: CDMA2000/EV-DO and WCDMA/HSPA.

CDMA2000/EV-DO

- CDMA2000:** A circular diagram showing multiple small circles labeled "Voice" distributed across a 1.25 MHz bandwidth.
- EV-DO:** A circular diagram showing a large central circle labeled "Data" with the text "Give all resources to one user at a time (data optimized)" below it, surrounded by a 1.25 MHz bandwidth.

WCDMA/HSPA

- A circular diagram showing a large central circle labeled "Data" with the text "After voice users served, remaining resources used for data based on same principles as EV-DO" below it, surrounded by a 5 MHz bandwidth.
- Surrounding the central "Data" circle are smaller circles labeled "Voice".

The diagram illustrates the evolution of mobile data speeds from 2G to 3G technologies. It features three vertical bars representing different standards, each with its peak data rate and a color-coded legend.

Technology	Peak Data Rate (Mbps)	Color
Mobile 2G GSM / GPRS	<0.5 Mbps	Light Blue
Mobile 3G CDMA2000 / EV-DO	3.1 Mbps → 14.7 Mbps	Green
Mobile 3G WCDMA / HSPA	14.4 Mbps → 63+ Mbps	Cyan

Peak Data Rate (Mbps)

EV-DO and HSPA Benefits

- Delivered achievable throughput >2 Mbps
- Reduced operator cost for data services
- Continuous evolution for enhanced services

Keuntungan 3G

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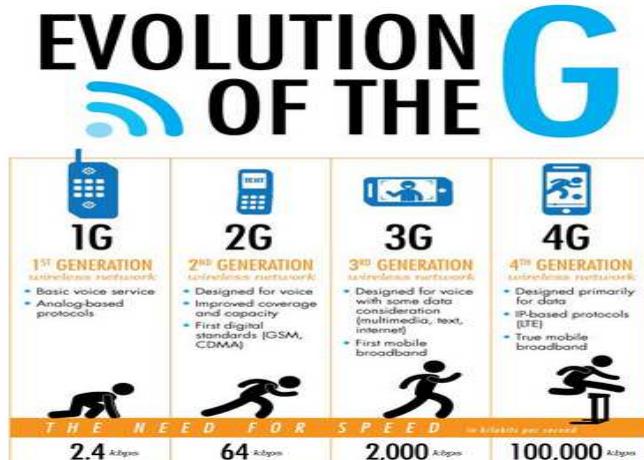


Mobile Cellular Network

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4G LTE

LTE adalah lanjutan dan evolusi 2G dan 3G sistem dan juga untuk menyediakan layanan tingkat kualitas yang sama dengan jaringan wired. LTE ini merupakan pengembangan dan teknologi sebelumnya, yaitu UMTS (3G) dan HSPA (3.5G) yang mana LTE disebut sebagai generasi ke-4 (4G).

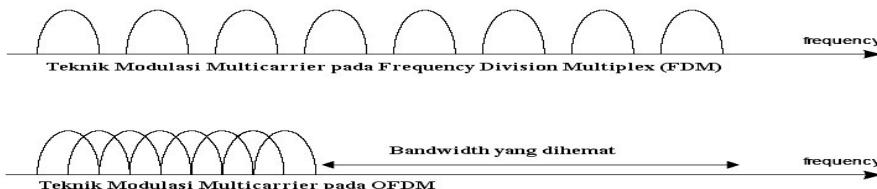


Mobile Cellular Network

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4G LTE

- ❖ LTE menggunakan teknologi OFDM (Orthogonal Frequency Division Multiplexing)
 - ❖ OFDM : teknik transmisi yang menggunakan beberapa buah frekuensi yang saling tegak lurus (orthogonal)
 - ❖ Mirip seperti FDM dengan membagi beberapa kanal yang dialokasikan tiap user, tetapi OFDM menggunakan spektrum yang lebih efisien dengan channel spacing antar pengguna lebih dekat



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Keuntungan 4G LTE

Download, browse, stream, and game faster than ever with faster and better connectivity

Connect Faster	Wider Channels Flexible support for channels up to 20 MHz enabled with OFDMA	More Antennas Advanced MIMO techniques to create spatially separated paths; 2x2 MIMO mainstream	Carrier Aggregation Aggregate up to 100 MHz for higher data rates – 2 carrier (2C) commercial; 3C announced ¹
Connect Real-time	Simplified Core Network All IP network with flattened architecture resulting in less equipment per transmission	Low Latencies Optimized response times for both user and control plane improves user experience	

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1G 2G 3G 4G 5G

Compare the speed of the Gs below...if kbps were mph

1G	2G	3G	4G	5G
24	64	2,000	100,000	10,000,000
A slow walk	A car on the highway	A fighter jet	The Juno space probe orbiting Jupiter	A starship

Protokol dan Fitur-fitur Mobile Cellular Network

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Materi 2

Protokol dan Fitur-fitur pada Mobile Cellular Network

Protokol dan Fitur-fitur Mobile Cellular Network

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1G

- Voice Signals Only
- Analogue Cellular Phones
- NMT, AMPS, TACS

2G

- Voice & Data Signals
- Digital Fidelity Cellular Phones
- GSM, CDMA (IS-95), D-AMPS (IS-34/136), PDC

2.5G

- Enhance 2G
- Higher Data Rates
- GPRS, EDGE

3G

- Voice, Data & Video Signals
- Video Telephony / Internet Surfing
- 3G, W-CDMA/UMTS , CDMA2000, UWC-136

4G

- Enhanced 3G / Interoperability Protocol
- High Speed & IP-based
- 4G, Mobile IP : LTE-Advanced, WiMAX-2

Protokol dan Fitur-fitur Mobile Cellular Network

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Yang termasuk teknologi dan protokol pada **1G** yakni:

1. AMPS (Advanced Mobile Phone Service) atau IS-136
2. NMT (Nordic Mobile Telephony)
3. HICAP
4. TACS
5. C 450
6. C-Netz
7. Mobitex
8. DataTAC

Protokol dan Fitur-fitur Mobile Cellular Network

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Yang termasuk teknologi dan protokol pada **2G** yakni:

1. Global System for Mobile (GSM)
2. General Packet Radio Service (GPRS)
3. Enhanced Data Rates for GSM Evolution (EDGE)



Protokol dan Fitur-fitur Mobile Cellular Network

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Yang termasuk teknologi dan protokol pada 3G yakni:

1. EDGE (Enhanced Data Rates for Global/GSM Evolution) atau E-GPRS (Enhanced -General Packet Radio Services).
2. W-CDMA (Wideband – Coded Division Multiple Access) atau UMTS (Universal Mobile Telecommunication System).
3. CDMA2000-1X EV/DV (Evolution/Data/Voice) dan CDMA2000-1X EV-DO (Data Only)/ (Data Optimized) atau IS-856.
4. TD-CDMA (Time Division Code Division Multiple Access) atau UMTS-TDD (Universal Mobile Telecommunication System – Time Division Duplexing)
5. GAN (Generic Access Network) atau UMA (Unlicensed Mobile Access)
6. HSPA (High-Speed Packet Access)
7. HSDPA (High Speed Downlink Packet Access)
8. HSUPA (High Speed Uplink Packet Access)
9. HSPA+ (HSPA Evolution)
10. FOMA (Freedom of Mobile Multimedia Access)
11. HSOPA (High Speed OFDM Packet Access)
12. TD-SCDMA (Time Division Synchronous Code Division Multiple Access)



Protokol dan Fitur-fitur Mobile Cellular Network

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Yang termasuk teknologi dan protokol pada 4G yakni:

1. 4G Revolutioner (4G-R)
2. 4G Evolutioner (4G-E)
3. IP-Media Subsystem (IMS)

Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

Materi 3

Arsitektur GSM pada Mobile Cellular Network

Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

- ❖ Global System for Mobile Communication (GSM) merupakan sistem teknologi seluler generasi ke-2 (2G).
- ❖ Teknologi ini mengadopsi sistem modulasi digital, kapasitas lebih besar, kualitas suara dan sekuritas yang lebih baik jika dibandingkan teknologi seluler generasi pertama AMPS (1G) yang masih analog

Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

Arsitektur Jaringan GSM terdiri dari 3 bagian utama :

1. Switching Subsystem (SSS) = Network Switching Subsystem (NSS)
2. Radio Subsystem (RSS) = Base Station Subsystem (BSS) & Mobile Station (MS)
3. Operation & Maintenance System (OMS) = Operation and Support System (OSS)

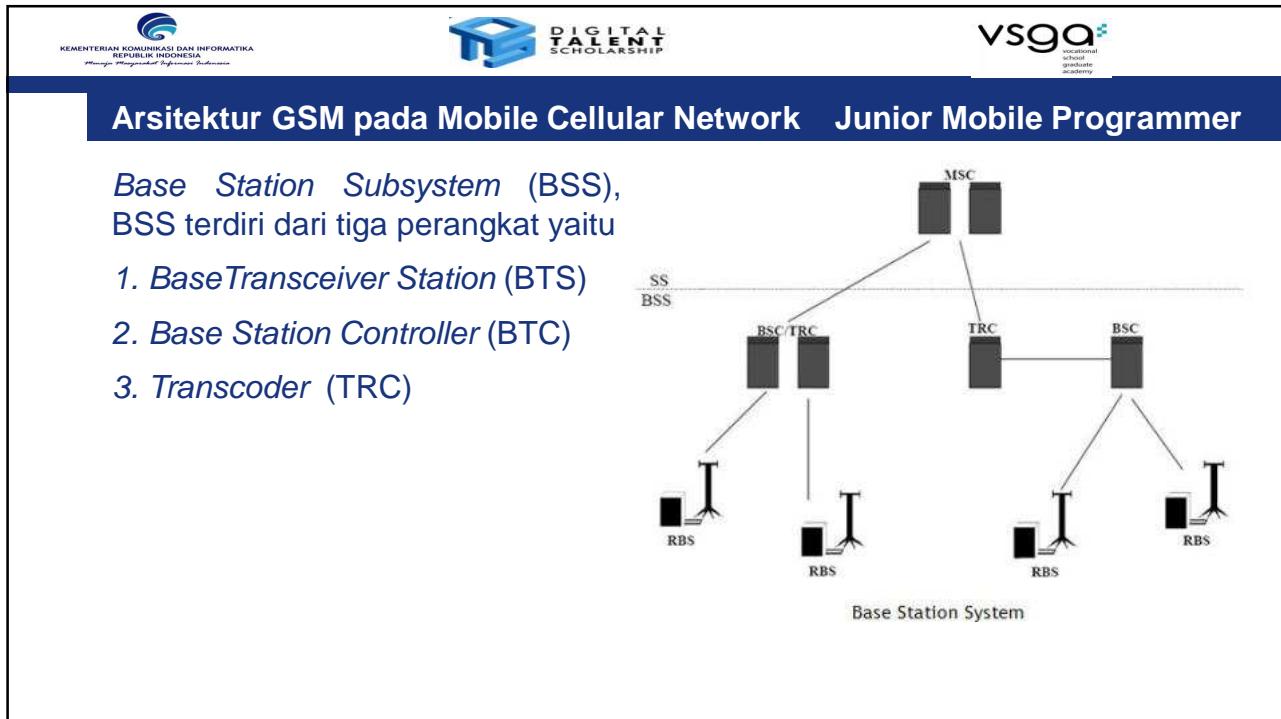
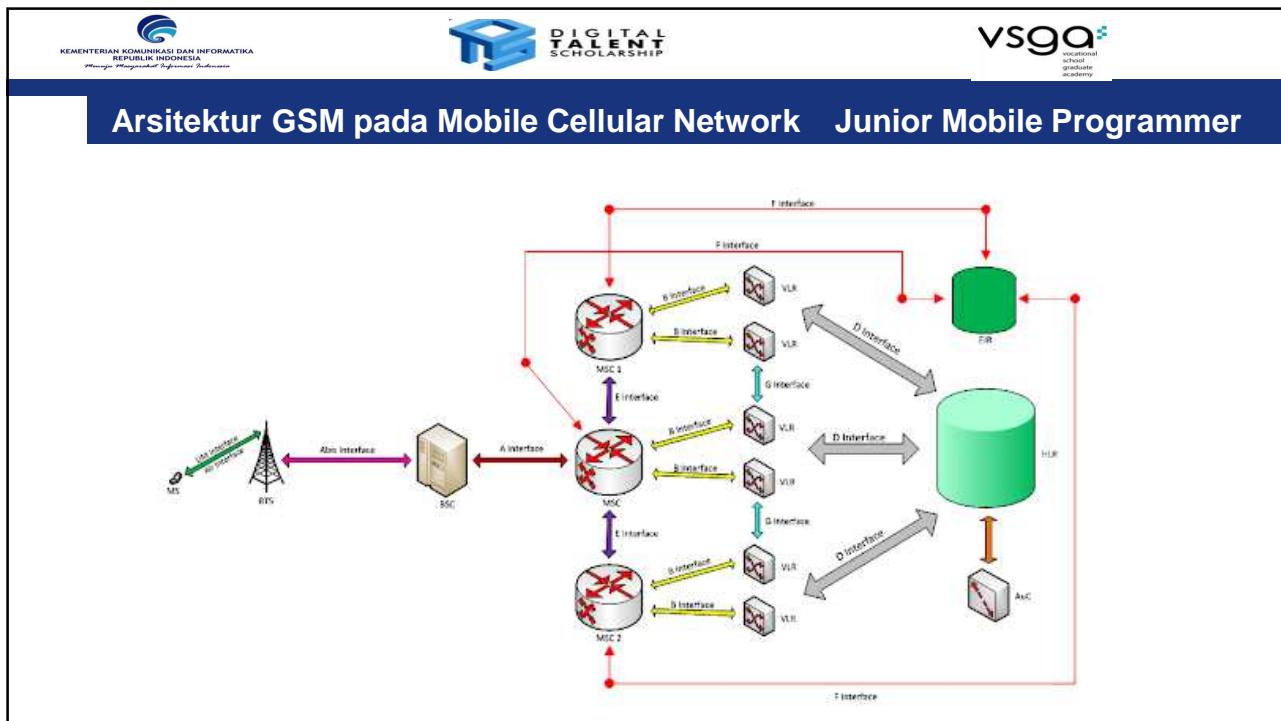
The diagram illustrates the GSM architecture. It shows two Base Station Subsystems (BSS) each consisting of multiple Base Transceiver Stations (BTS) connected to a Base Station Controller (BSC). Mobile Stations (MS) are shown communicating with the BTS. The BSCs are interconnected via the Abis interface. A central Switching Subsystem (SS) contains a Mobile Switching Center (MSC) which connects to the Public Switched Telephone Network (PSTN). The SS also contains databases such as EIR, HLR, AuC, and VLR. The OMC (Operation and Maintenance Center) is connected to the MSC. Information transmission is indicated by dashed lines, while call connections are shown with solid lines.

Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

Sistem GSM memiliki tiga buah antarmuka standar yang terdiri dari :

1. Antarmuka udara (Um-interface) yang menghubungkan perangkat MS dan BTS,
2. Antarmuka Abis (Abis-interface) yang menghubungkan BTS dan BSC, serta
3. Antarmuka A (A-interface) berupa PCM line yang menghubungkan BSC dan MSC

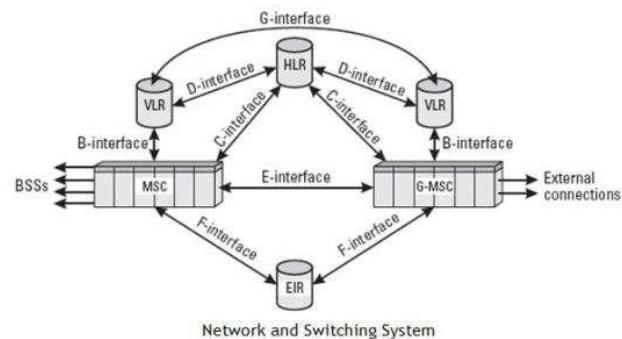
The diagram shows the three standard interfaces in the GSM architecture. The Air Interface (Um) connects the Mobile Station (MS) to the Base Transceiver Station (BTS). The Abis Interface connects the BTS to the Base Station Controller (BSC). The A Interface connects the BSC to the Mobile Switching Center (MSC). The MSC is also connected to the Public Switched Telephone Network (PSTN) and various databases (VLR, HLR, AuC, EIR) within the Network Switching Subsystem (NSS). The OMC (Operation and Maintenance Center) is connected to the MSC. The interfaces are represented by dashed lines, while the physical connections between components are shown with solid lines.



Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

Komponen NSS pada jaringan GSM terdiri dari : yaitu :

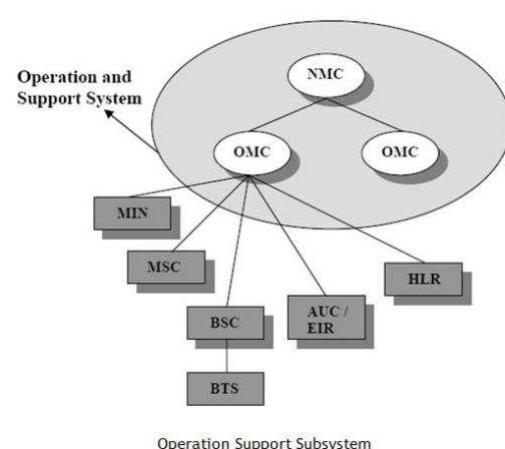
1. Mobile Switching Center (MSC)
2. Home Location Register (HLR)
3. Visitor Location Register (VLR)
4. Authentication Center (AuC)
5. Equipment Identity Register (EIR)
6. Gateway MSC (GMSC)



Arsitektur GSM pada Mobile Cellular Network Junior Mobile Programmer

Komponen OSS pada jaringan GSM terdiri dari:

1. Operation and Maintenance Center (OMC), OMC sebagai pusat pengontrolan operasi dan pemeliharaan jaringan. Fungsi utamanya mengawasi alarm perangkat dan perbaikan terhadap kesalahan operasi.
2. Network Management Centre (NMC), NMC berfungsi untuk pengontrolan operasi dan pemeliharaan jaringan yang lebih besar dari OMC.



Mobile Phone Network

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Materi 4

Mobile Phone Network

Mobile Phone Network

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- ❖ Contoh paling umum dari jaringan seluler adalah jaringan telepon seluler (telepon seluler)
- ❖ Ponsel adalah telepon portabel yang menerima atau melakukan panggilan melalui BTS
- ❖ Jaringan mobile phone modern menggunakan cell karena keterbatasan frekuensi radio

Mobile Phone Network

Struktur dari mobile phone cellular network terdiri dari :

1. Jaringan Radio Base Station atau base station subsystem.
2. Core circuit switched network yang menangani panggilan suara dan teks.
3. Packet switched network yang menangani mobile data
4. Public switched telephone network yang menghubungkan antar bagian subscribers dengan jaringan telepon besar lainnya.

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Mobile Phone Network

Handover

Handover (HO) adalah pengalihan panggilan dari satu sel ke sel lain ketika sebuah telefon seluler bergerak melewati wilayah cakupan layanan lintas sel.

Proses Handover terjadi karena kualitas atau daya ratio turun di bawah nilai yang dispesifikasi dalam BSC. Penurunan level sinyal ini dideteksi dari pengukuran yang dilakukan MS maupun BTS.

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Mobile Phone Network **Junior Mobile Programmer**

Proses Handover

Mobile Phone Network **Junior Mobile Programmer**

Frekuensi Seluler

1. Pada perkembangan teknologi mobile phone network generasi pertama kali menggunakan teknologi analog circuit-switched dengan berbasis frequency division multiple access (FDMA), bekerja pada pita frekuensi 800–900 MHz.
2. Pada teknologi mobile phone network generasi kedua menggunakan frekuensi yang dipakai dalam teknologi GSM yaitu 890–960 MHz dan 1710–1880 MHz.
3. Pada teknologi mobile phone network generasi ketiga sampai sekarang menggunakan frekuensi 1710–2170 MHz.



Mobile IP **Junior Mobile Programmer**

Materi 5

Proses- Proses pada Mobile IP Concept



Mobile IP **Junior Mobile Programmer**

Kondisi Mobile Network Sekarang ?





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Perangkat Mobile

Vs

Perangkat Non Mobile

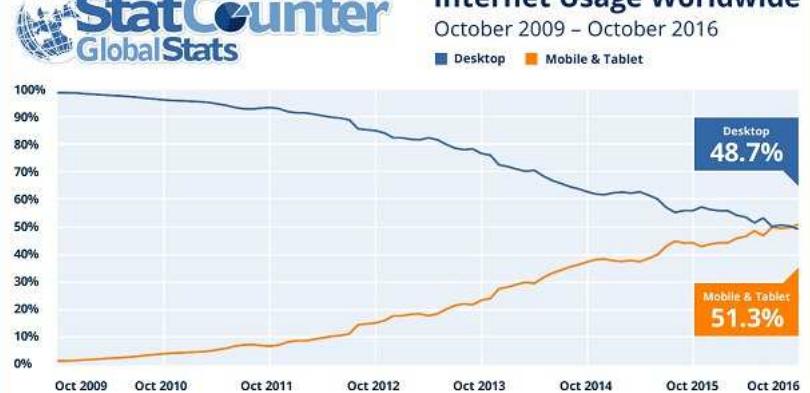




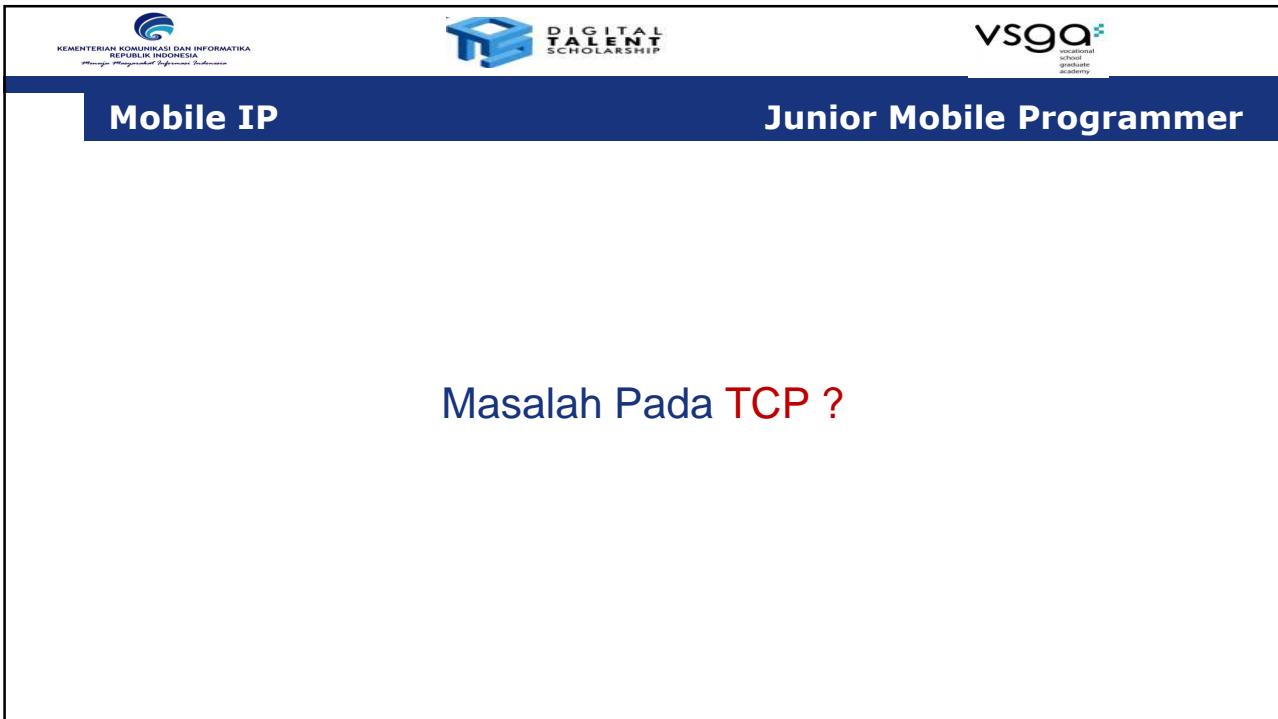
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Internet Usage Worldwide
October 2009 – October 2016

■ Desktop ■ Mobile & Tablet



Period	Desktop (%)	Mobile & Tablet (%)
Oct 2009	100%	0%
Oct 2010	~98%	~2%
Oct 2011	~96%	~4%
Oct 2012	~92%	~10%
Oct 2013	~85%	~20%
Oct 2014	~65%	~35%
Oct 2015	~55%	~45%
Oct 2016	48.7%	51.3%



**Mobile IP****Junior Mobile Programmer**

Host harus berada di **lokasi**
atau
jangkauan wilayah yang **tetap**

**Mobile IP****Junior Mobile Programmer**

Mengandalkan **Routing** Untuk mengirim data



Mobile IP **Junior Mobile Programmer**

Bagaimana Jika User Berpindah Ke ruangan atau area lain ?



Mobile IP **Junior Mobile Programmer**

Solusi ?

Mobile IP

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Mobile IP

Protokol komunikasi yang di desain untuk **perangkat mobile** agar memiliki **ip address permanen** walaupun **berpindah network**

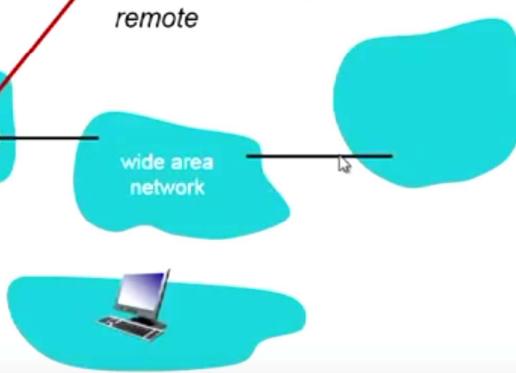
Mobile IP

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home network: permanent “home” of mobile (e.g., 128.119.40/24)

permanent address: address in home network, can always be used to reach mobile e.g., 128.119.40.186

home agent: entity that will perform mobility functions on behalf of mobile, when mobile is remote



Mobile IP

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Mobile Node

The diagram illustrates a mobile node connected to a home network. The mobile node is shown as a laptop connected to a small cloud labeled "home network". A red arrow points from the text "permanent address: address in home network, can always be used to reach mobile e.g., 128.119.40.186" to the laptop. Another red arrow points from the text "home network: permanent 'home' of mobile (e.g., 128.119.40/24)" to the same laptop. A third red arrow points from the text "home agent: entity that will perform mobility functions on behalf of mobile, when mobile is remote" to a larger cloud labeled "wide area network" which contains a router icon. The mobile node is also connected to this router.

Mobile Node

Semua bentuk perangkat mobile yang terhubung ke Home Network.

Mobile node pada protocol Mobile IP memiliki 2 ip addres yaitu : **Permanent Address** dan **Care Off Address**

Mobile IP

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Home Agent

The diagram illustrates a home agent managing a mobile node. A laptop connected to a "home network" cloud (labeled "permanent address" and "home network") is connected via a router to a "wide area network" cloud. Inside the "wide area network" cloud, there is a larger cloud labeled "home agent" containing a router icon. A red arrow points from the text "home network: permanent 'home' of mobile (e.g., 128.119.40/24)" to the laptop. Another red arrow points from the text "home agent: entity that will perform mobility functions on behalf of mobile, when mobile is remote" to the "home agent" cloud. A third red arrow points from the text "permanent address: address in home network, can always be used to reach mobile e.g., 128.119.40.186" to the laptop.

Home Agent

Router yang memiliki kemampuan khusus yang sedang melayani jaringan dimana **Mobile Node** sedang terhubung.

Home Agent dianggap menjadi "rumah" permanen dimana Mobile Node terhubung pertama kali.

Permanent Addres di dapatkan oleh Mobile Node pada Router ini.

Mobile IP

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permanent address: remains constant (e.g., 128.119.40.186)

care-of-address: address in visited network. (e.g., 79.129.13.2)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

correspondent: wants to communicate with mobile

wide area network

Mobile IP

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Permanent Address

permanent address: remains constant (e.g., 128.119.40.186)

care-of-address: address in visited network. (e.g., 79.129.13.2)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

correspondent: wants to communicate with mobile

wide area network

Alamat IP yang didapat oleh Mobile Node pada jaringan Home Agent nya, alamat ip ini tidak berubah walaupun Mobile Node berpindah jaringan.

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Care Off Address

permanent address: remains constant (e.g., 128.119.40.186)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

care-of-address: address in visited network. (e.g., 79.129.13.2)

wide area network

correspondent: wants to communicate with mobile

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

Alamat IP dari router yang menjadi "rumah" baru bagi Mobile Node, alamat ip ini merupakan tambahan terhadap IP permanent address

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Visited Network

permanent address: remains constant (e.g., 128.119.40.186)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

care-of-address: address in visited network. (e.g., 79.129.13.2)

wide area network

correspondent: wants to communicate with mobile

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

Jaringan Baru yang menjadi rumah bagi Mobile Node.

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Foreign Agent

permanent address: remains constant (e.g., 128.119.40.186)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

care-of-address: address in visited network (e.g., 79.129.13.2)

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

correspondent: wants to communicate with mobile

Router pada Visited Network yang melayani Mobile Node pada jaringan yang baru.

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Correspondent

permanent address: remains constant (e.g., 128.119.40.186)

visited network: network in which mobile currently resides (e.g., 79.129.13/24)

care-of-address: address in visited network (e.g., 79.129.13.2)

foreign agent: entity in visited network that performs mobility functions on behalf of mobile.

correspondent: wants to communicate with mobile

Mobile Node lain yang sedang berkomunikasi dengan Mobile Node yang berpindah jaringan





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Proses Mobile IP

Agent Discovery
Mobile Node Registration
Direct Routing





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Agent Discovery

Home Agent dan Foreign Agent, Melakukan broadcast paket ICMP untuk memberi tahu seluruh Mobile Node yang ada pada jaringannya.

Mobile Node akan selalu mendengarkan (listen) terhadap broadcast dari Home Agent / Foreign Agent, jika mendapatkan broadcast Mobile Network Menginisiasi Proses Registrasi.

Proses Registrasi Selalu di inisiasi oleh Mobile Node baik ke Home Agent atau Foreign Agent




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Mobile Node Registration

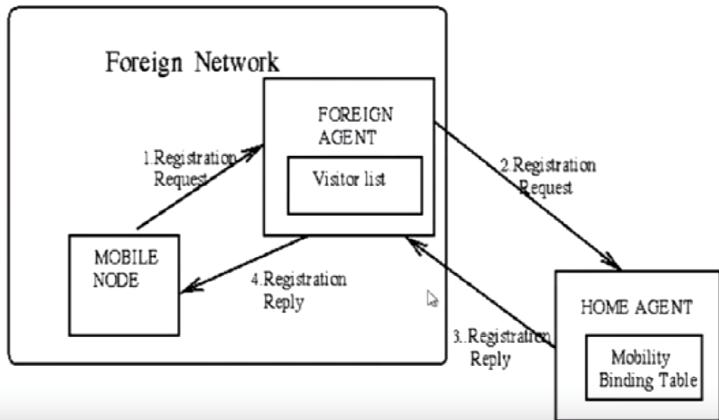
Di Home Network
 ↓
 Mobile Node Registrasi Ke Home Agent
 ↓
 Hanya Mengisi Permanent Address,
 Tanpa Mengisi Care Off Address

* Registrasi terjadi setiap kali Mobile Node berpindah jaringan




Mobile IP **Junior Mobile Programmer**

Mobile Node Registration



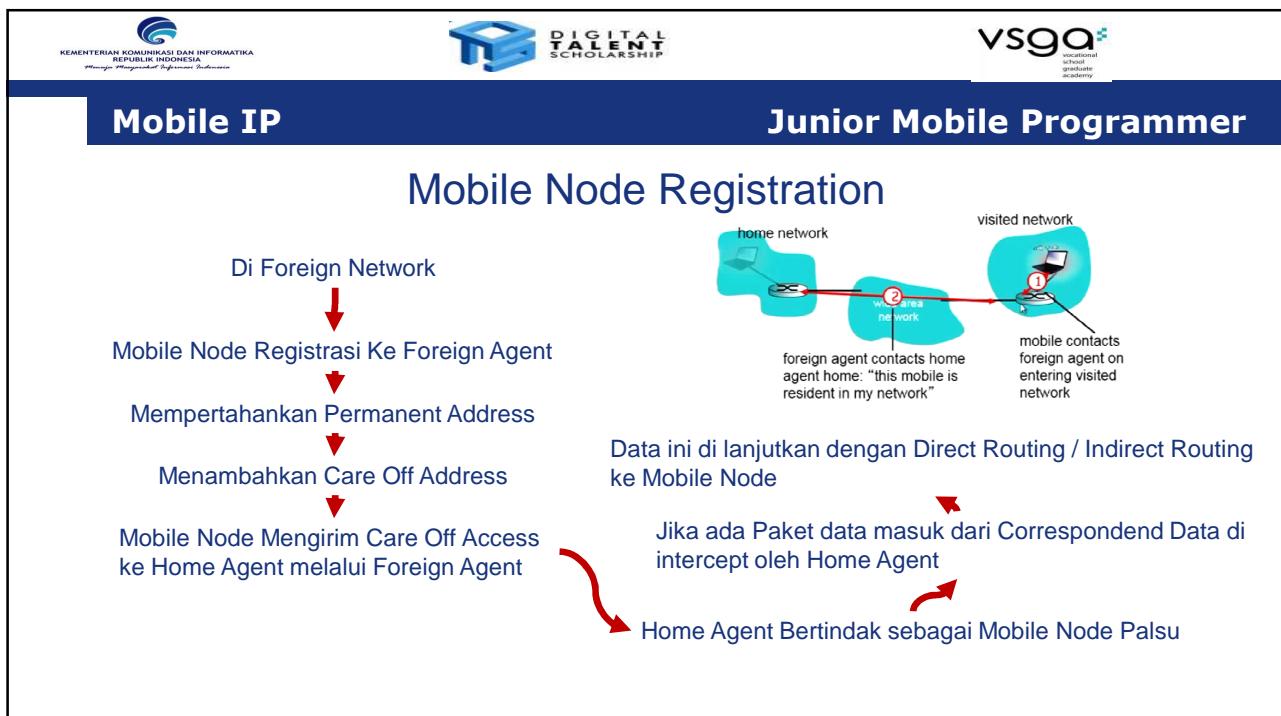
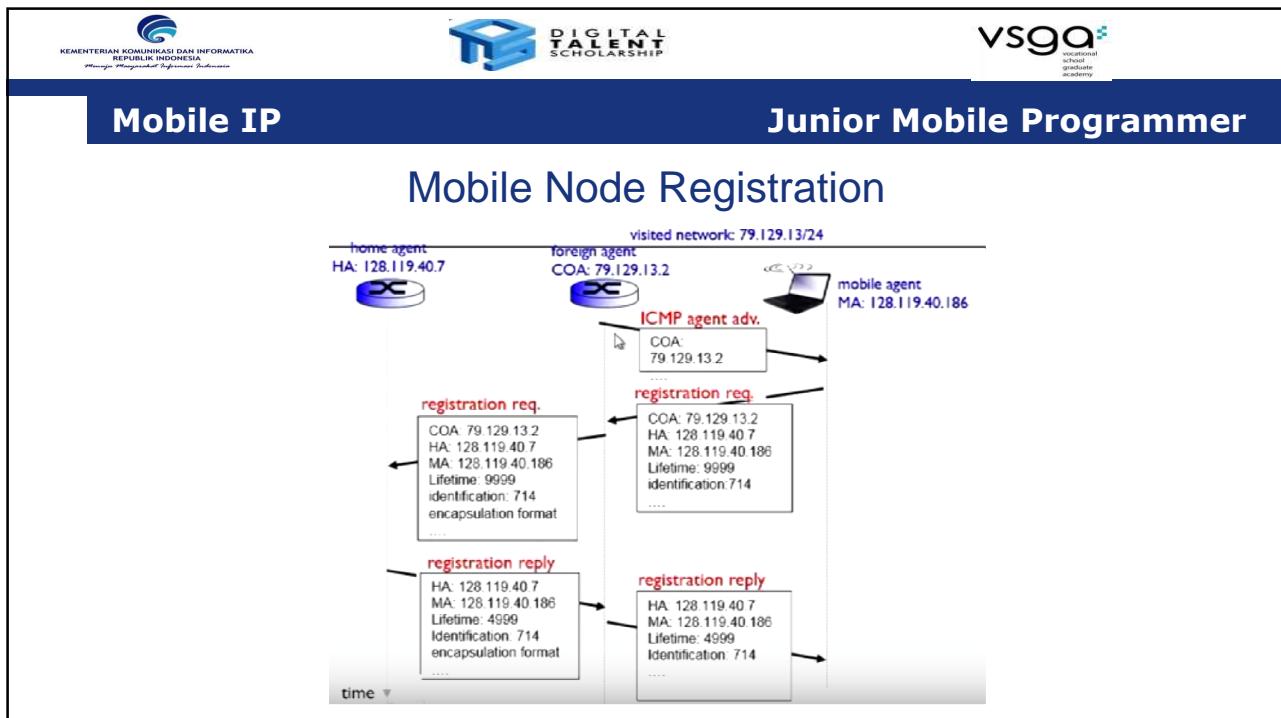
```

graph LR
    MN[MOBILE NODE] -- "1. Registration Request" --> FA[FOREIGN AGENT]
    subgraph FN [Foreign Network]
        FA
        VR[Visitor list]
    end
    FA -- "2. Registration Request" --> HA[HOME AGENT]
    subgraph HN [Home Network]
        HA
        MT[Mobility Binding Table]
    end
    HA -- "3. Registration Reply" --> FA
    FA -- "4. Registration Reply" --> MN
  
```

The diagram illustrates the mobile node registration process between a Foreign Network and a Home Network. It shows the interaction between a Mobile Node, a Foreign Agent, and a Home Agent.

- Step 1:** The Mobile Node sends a "Registration Request" to the Foreign Agent.
- Step 2:** The Foreign Agent forwards a "Registration Request" to the Home Agent.
- Step 3:** The Home Agent sends a "Registration Reply" back to the Foreign Agent.
- Step 4:** The Foreign Agent forwards a "Registration Reply" back to the Mobile Node.

The Foreign Agent maintains a "Visitor list" and the Home Agent maintains a "Mobility Binding Table".



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Indirect Routing

The diagram illustrates the process of indirect routing in a mobile IP network. It shows three main components: a home network, a wide area network, and a visited network. A mobile device is connected to the home network. A correspondent in the wide area network sends packets to the mobile device. The mobile's home agent intercepts these packets and forwards them to a foreign agent in the visited network. The foreign agent then receives the packets, forwards them to the mobile device, and finally, the mobile device replies directly back to the correspondent.

home network

home agent intercepts packets, forwards to foreign agent

correspondent addresses packets using home address of mobile

wide area network

foreign agent receives packets, forwards to mobile

visited network

mobile replies directly to correspondent

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Direct Routing

The diagram illustrates the process of direct routing in a mobile IP network. It shows three main components: a home network, a wide area network, and a visited network. A mobile device is connected to the home network. A correspondent in the wide area network sends packets to the mobile device. The correspondent first forwards the packets to a foreign agent in the visited network. The foreign agent then receives the packets, forwards them to the mobile device, and finally, the mobile device replies directly back to the correspondent.

home network

correspondent forwards to foreign agent

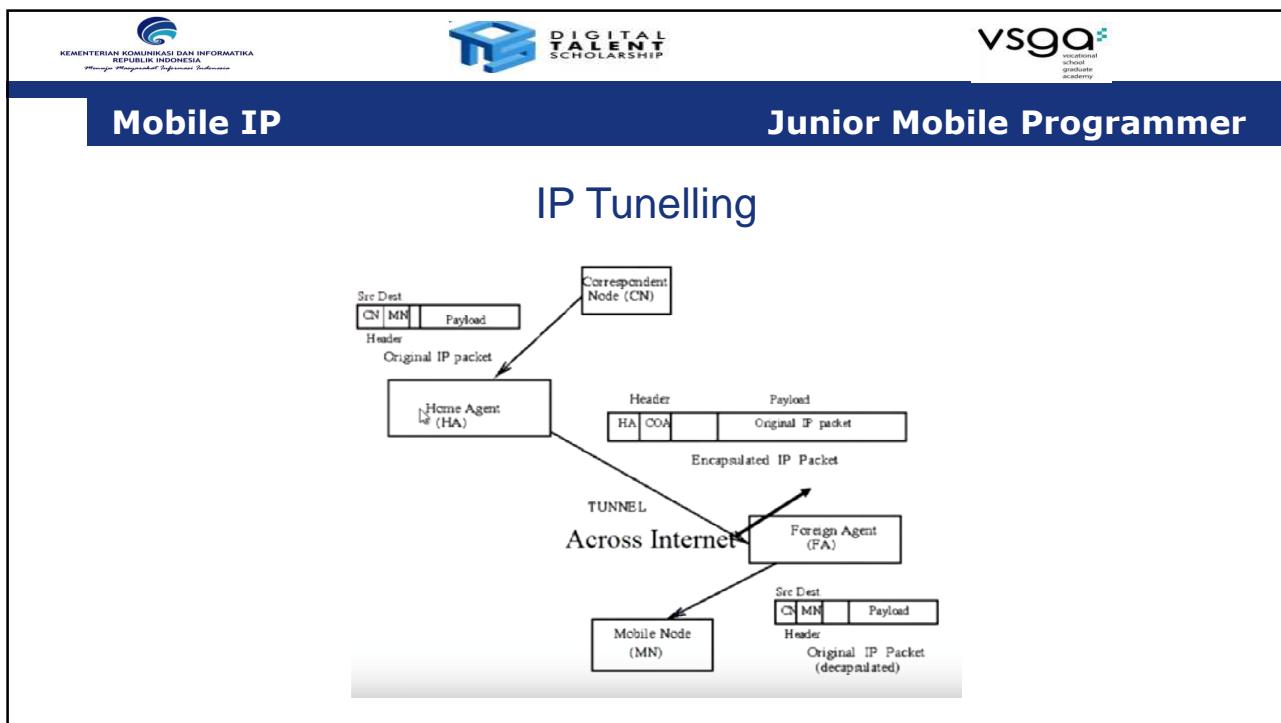
correspondent requests, receives foreign address of mobile

wide area network

foreign agent receives packets, forwards to mobile

visited network

mobile replies directly to correspondent



< Topik_Silabus > **Pelatihan**

Kesimpulan Pertemuan

1. <Kesimpulan materi 1>
2. <Kesimpulan materi 2>
3. <Kesimpulan materi 3>
4. <dst>

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