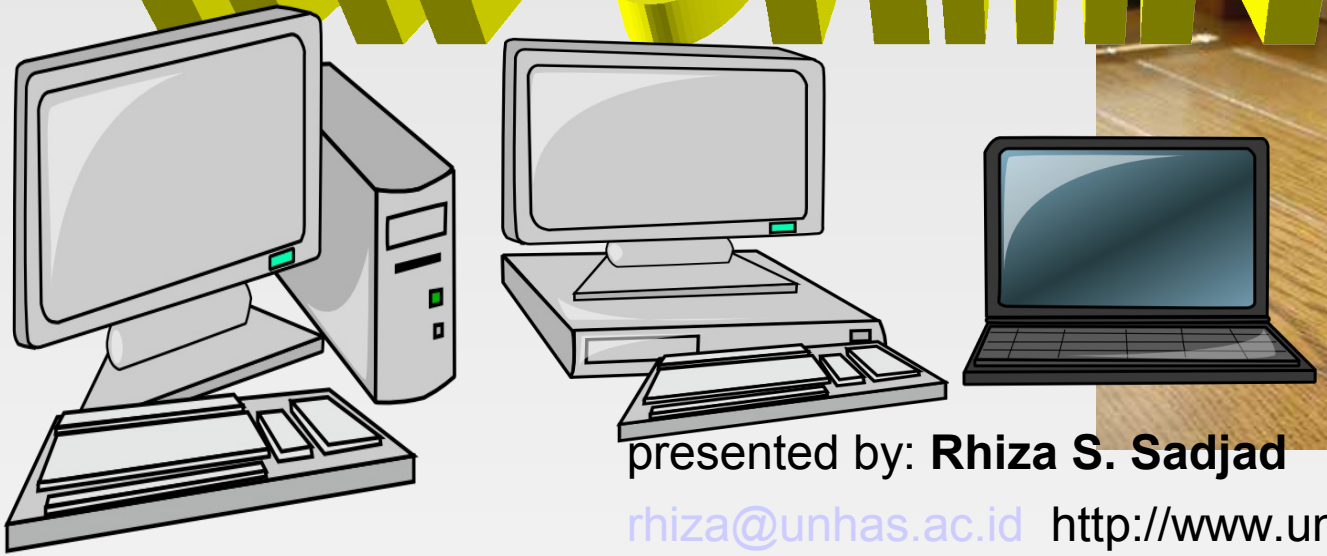
Information and Communication Technology:

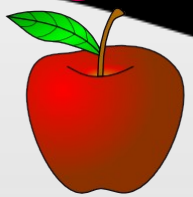
The INFORMATION THEORY (CONTINUED)



presented by: **Rhiza S. Sadjad**

rhiza@unhas.ac.id http://www.unhas.ac.id/rhiza/

The INFORMATION CAPACITY or Bit Rate of Data Transmission





1 bit per second → 1 bps

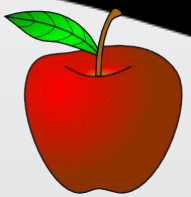
8 to 10 bit per second → 1 Byte per second
1 Bps

1000 bit per second → 1 Kbps

1000 Kbps → 1 Mbps

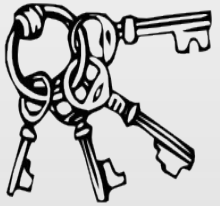
1000 Mbps → 1 Gbps

The Information Capacity (Bit Rate)

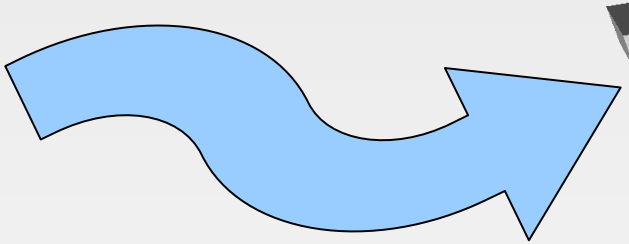






According to Shannon [1948], there are 2 (two) factors related to the information capacity:

- ***Bandwidth***
- ***Channel Quality*** **(*Signal to Noise Ratio*, S/N atau SNR)**



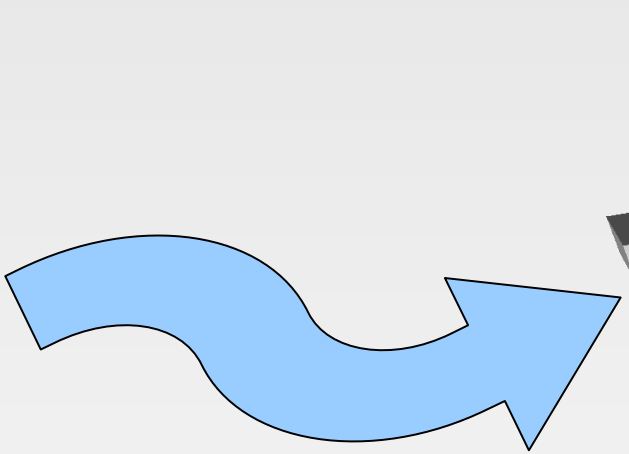
The Information Theory

The Communication Model

[1948] Claude E. Shannon, "*A Mathematical Theory of Communication*" *(a technical notes)*

/home/rhiza/Desktop/shannon.pdf

[1949] Claude E. Shannon and Warren Weaver, "*The Mathematical Theory of Communication*" (popular version)



The Information Theory

Communication Model

Shannon and Weaver [1949], **simplex mode**

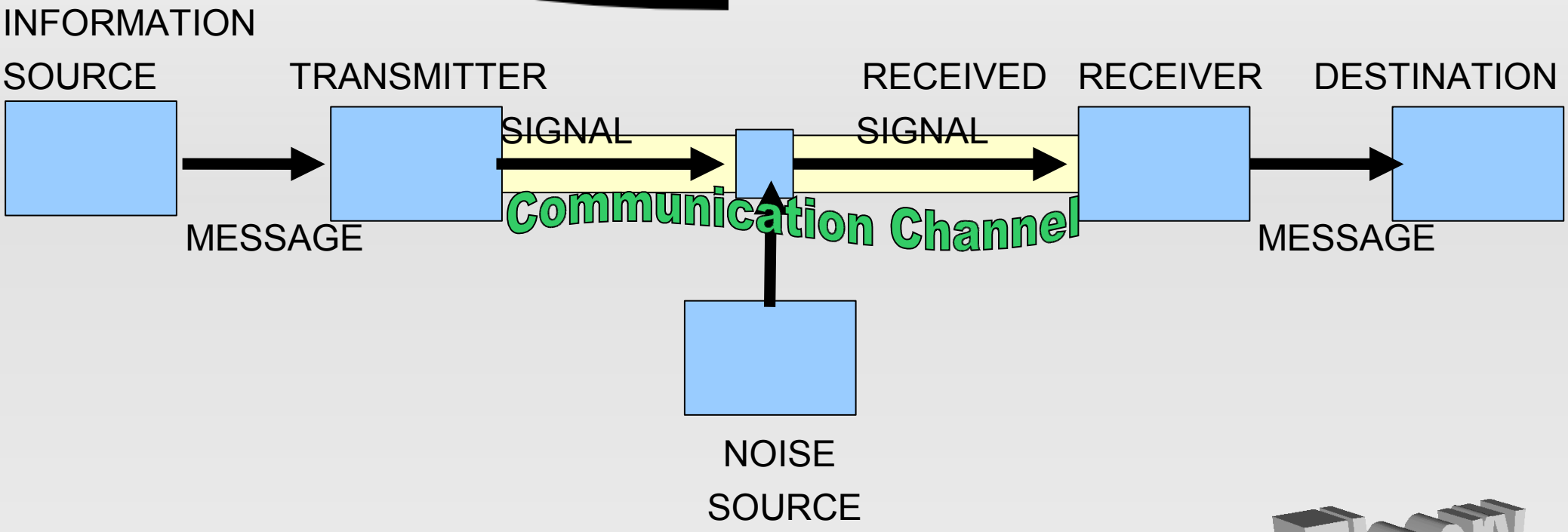
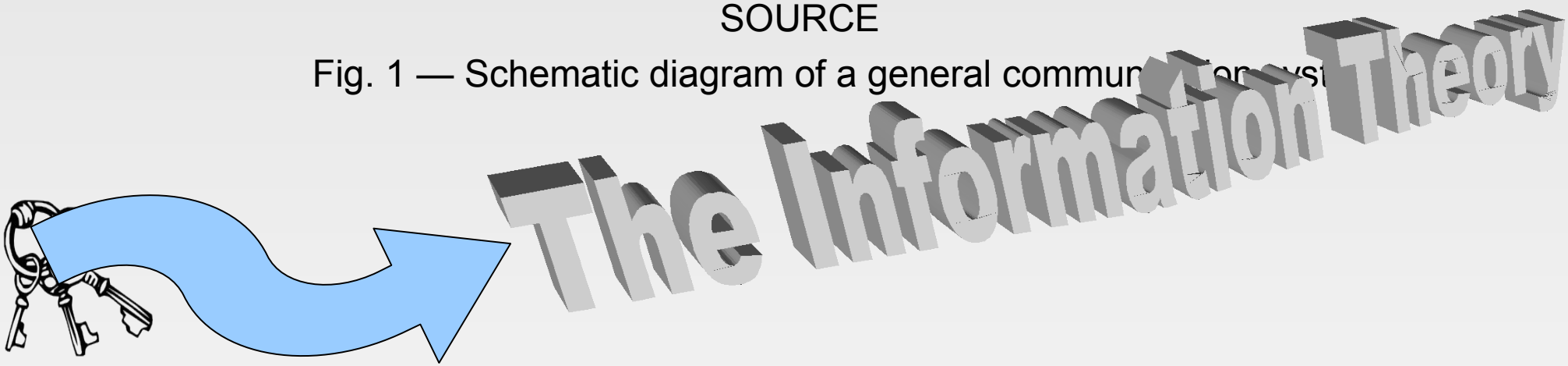


Fig. 1 — Schematic diagram of a general commun[illegible]



The Information Capacity (Bit Rate)

Shannon and Weaver [1949], **simplex mode**

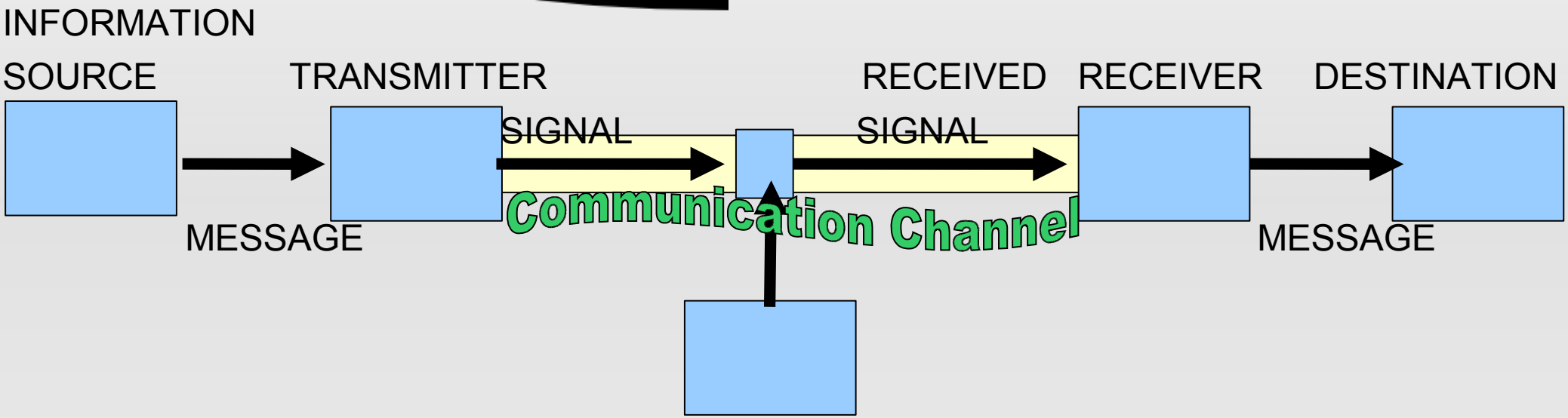


Fig. 1 — Schematic diagram of a general communication system.

The Shannon [**1948**] formula to compute the Information Capacity:

Information Capacity [bps] = (Bandwidthi [Hertz])* ^{2}log (1 + S/N)

Schweber, [**1996**], page **16**

The Information Capacity (Bit Rate)

The Shannon [**1948**] formula to compute the Information Capacity:

Information Capacity [bps] = (Bandwidthi [Hertz])* ^{2}log (1 + S/N)

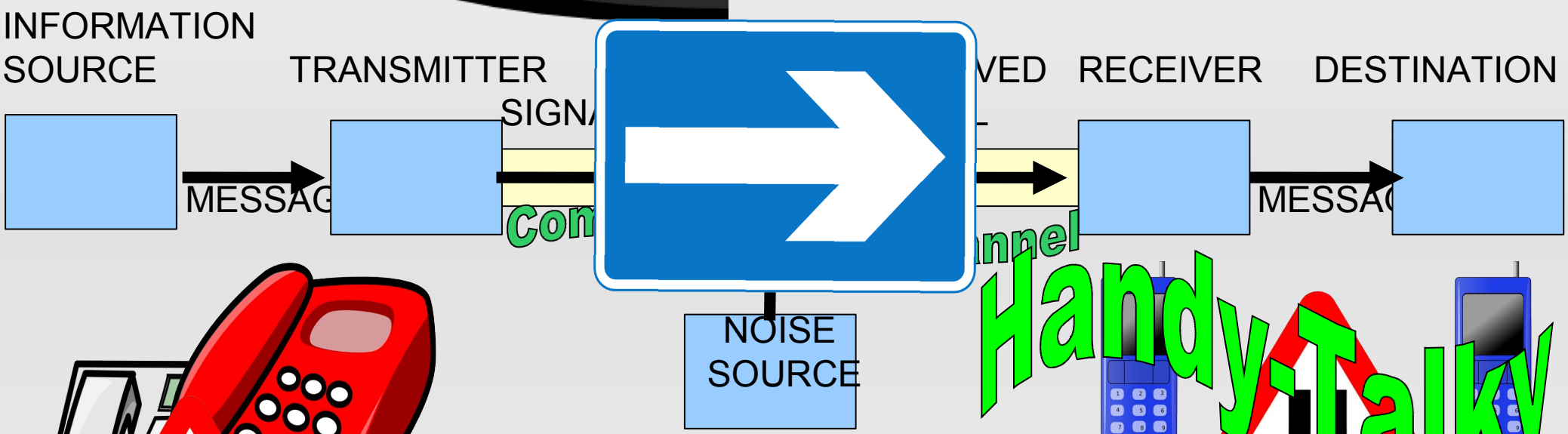
Schweber, [**1996**], page **16**

$$\textit{Bit Rate} = BW * {}^{2}\log (1 + S/N)$$

- *Bit Rate* (**The Information Capacity**) : The amount of information transmitted in a unit of time [**bit per second, bps**] through a communication channel
- **BW** (*Bandwidth*) :The spectrum of signals transmittable in the channel [**Hertz**, **getaran per detik**, *cycles per second*, **cps**], the difference between the highest freuency and the lowest frequency
- **S/N** (*Signal to Noise ratio*) : the quality of the channel in terms of the ratio of the transmitted signal power and the noise power

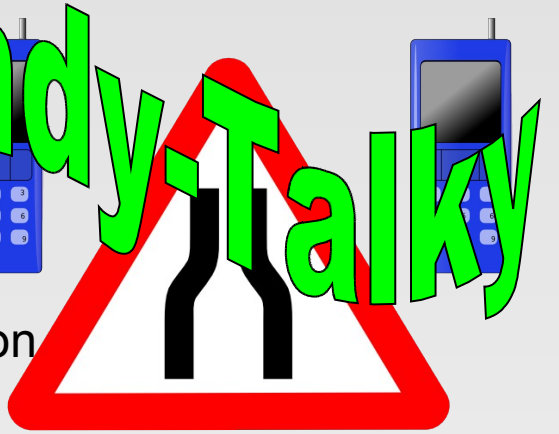
The MODEs of Communication

Shannon and Weaver [1949], simplex mode



— Schematic diagram of a general communication

FULL-DUPLEX (two SIMPLEXs)



HALF-DUPLEX (two SIMPLEXs, one at the time)

SINGLE-SOURCE SINGLE-DESTINATION

The MODEs of Communication

not a simplex mode

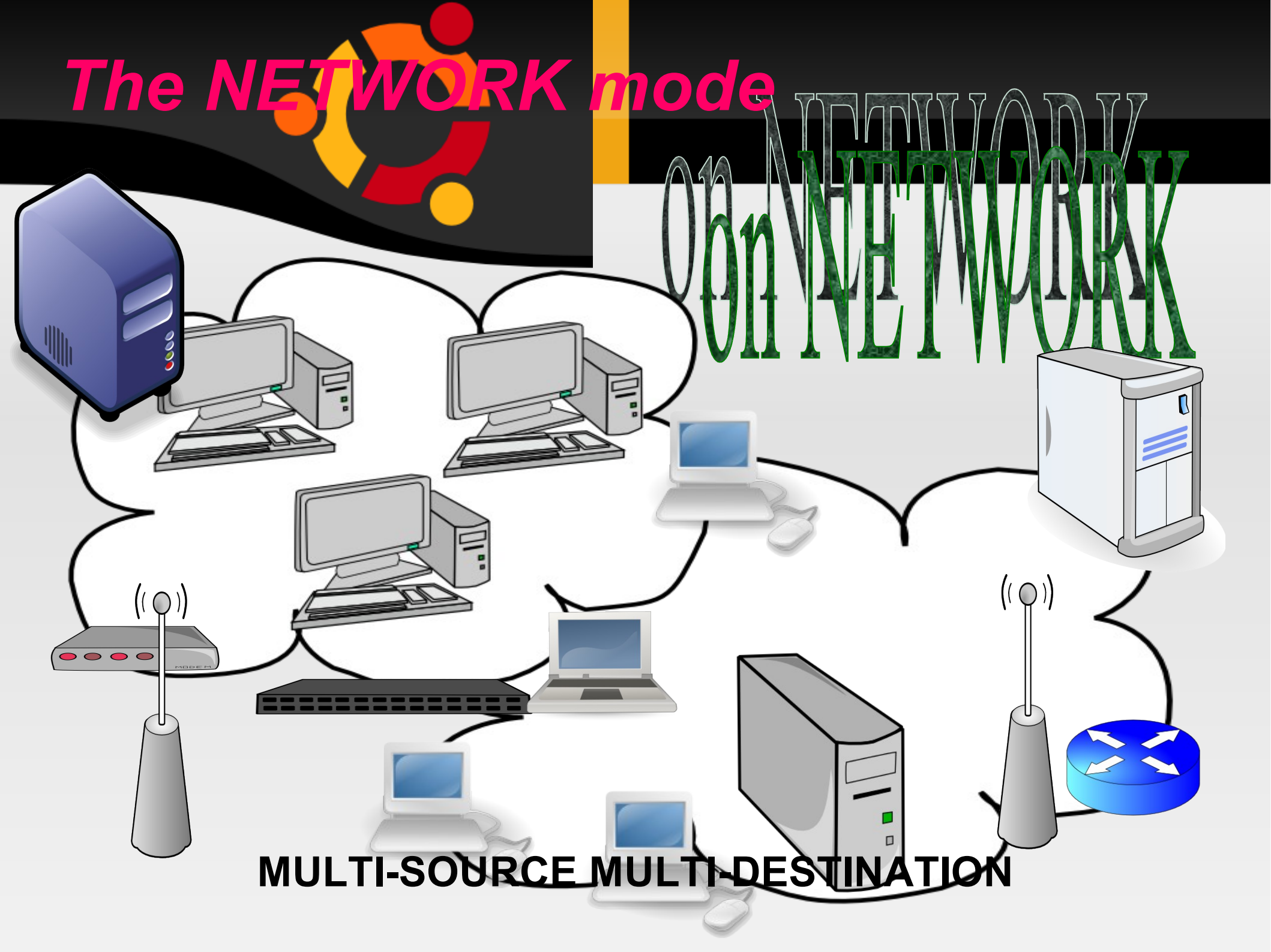
not a full-duplex

not a half-duplex, but .....

the NETWORK !

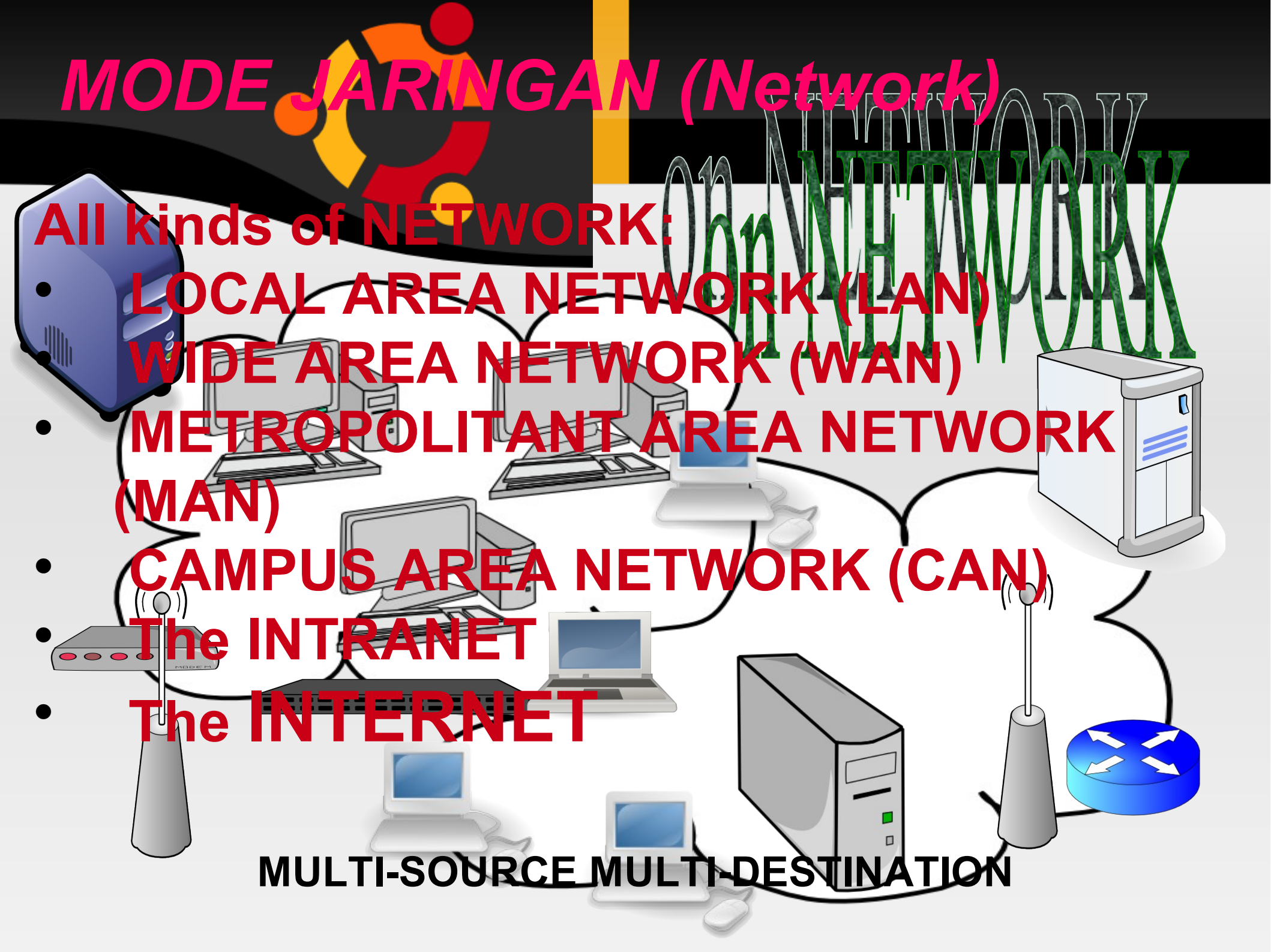
MULTI-SOURCE MULTI-DESTINATION

The NETWORK mode



MULTI-SOURCE MULTI-DESTINATION

MODE JARINGAN (Network)



- All kinds of NETWORK:
- LOCAL AREA NETWORK (LAN)
- WIDE AREA NETWORK (WAN)
- METROPOLITANT AREA NETWORK (MAN)
- CAMPUS AREA NETWORK (CAN)
- The INTRANET
- The INTERNET

MULTI-SOURCE MULTI-DESTINATION

The INTERNET .....

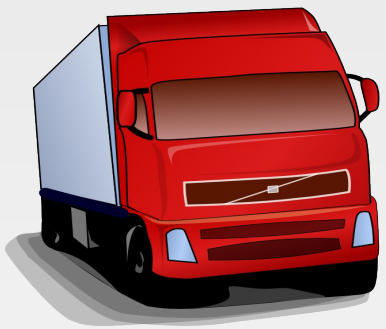
- Read : http://en.wikipedia.org/wiki/History_of_the_Internet
- A “non-hierarchical” organization
- Members: Computers and the Accessories
- “Permanent” and “Temporary” members
- Every single member has its ”IP address” (IP = Internet Protocol) :
  - Version 4: 000.000.000.000 to 255.255.255.255, ”local” and ”public” IP
  - Ipv6 (version 6)

The INTERNET member.....

- Every single member of the Internet has its specific function:
  - *servers*: mail-server, file-server, web-server, list-server, Domain-Name Server (DNS), dll.....
  - *routers:* the traffic controllers
  - *bridges*: connecting networks
  - *terminal*, *client*
  - etc.

Packet Data Communication .....

- Using a communication protocol: **TCP/IP**
- Communication by sending and receiving DATA PACKETS
- Each DATA PACKET has its CONTENTS and its ”WRAPPER”, its SENDER's Addr and its DESTINATION/RECEIVER's Address




Let's Go .....

to see .....the

Internet....