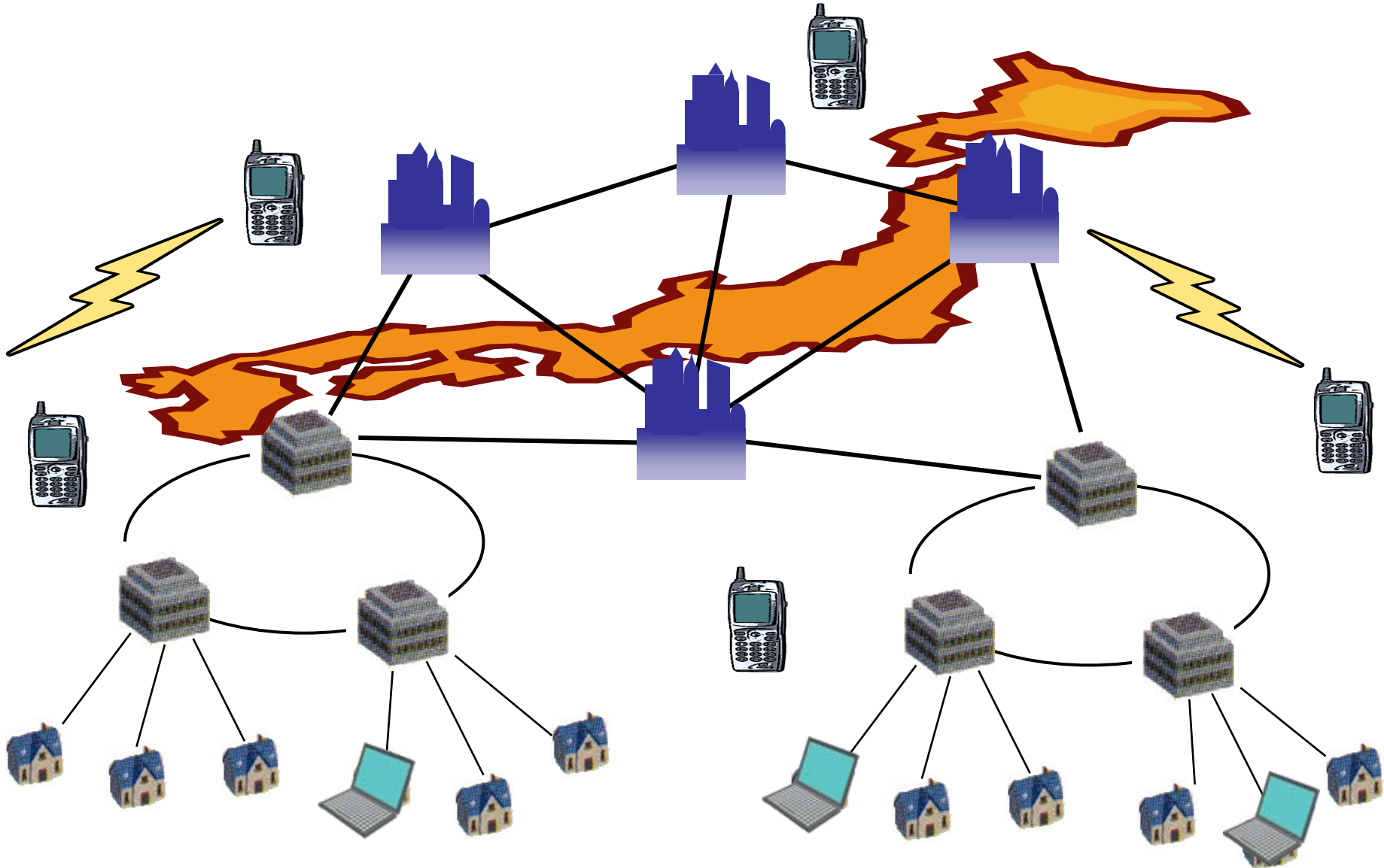


# **Latest Information & Communication Technologies (ICT)**

*presented by*

Division of Electrical, Electronic and Information Engineering  
Information and Communication Section

# Communications are everywhere.



# Contents of the class

(0) Introduction to Information & Communication Technologies (ICT)

(1) Optical communication technologies

Infrastructure of communication networks; past, present, and future

(2) Wireless communication technologies

Way for “ubiquitous world”; past, present, and future

Radio & Optics technologies

(3) Networking technologies

Mechanism of internet; how to connect internet

(4) Information processing technologies

Signal processing for security, multimedia content processing.

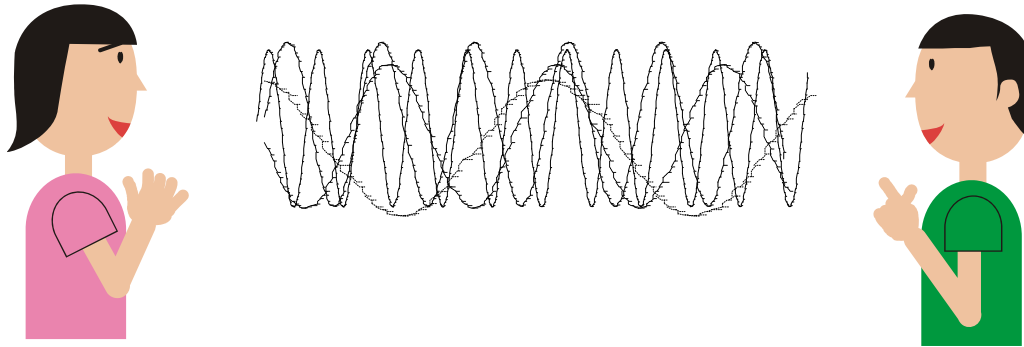
(5) Remote sensing technologies

Remote sensing on the ground for severe storm (thunder)

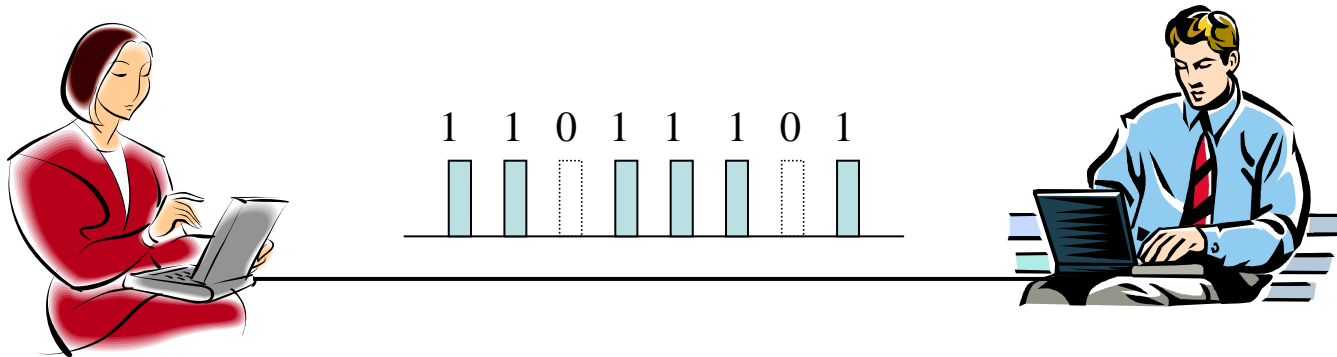
Remote sensing from space for earth observation

# What & Why digital communication ?

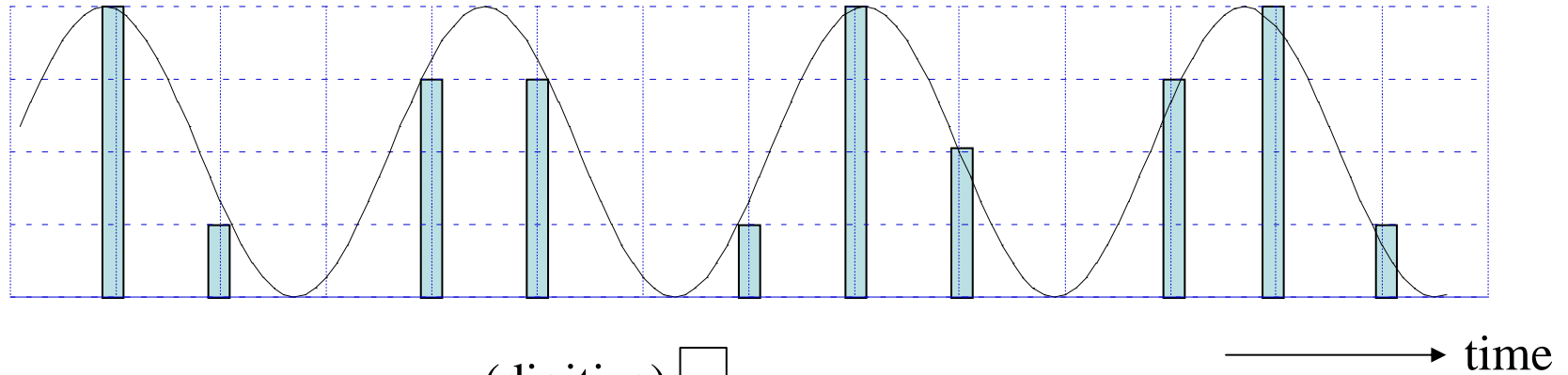
## Analogue



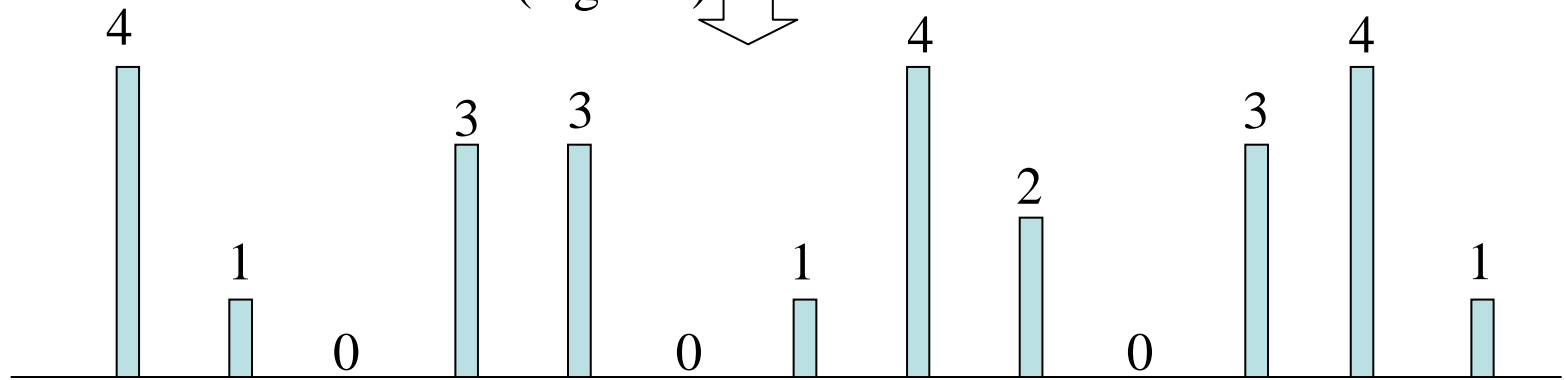
## Digital



# Analogue to Digital



(digitize) ↓



(to binary numbers)

“0” ↔ “000”    “1” ↔ “001”    “2” ↔ “010”    “3” ↔ “011”    “4” ↔ “100”

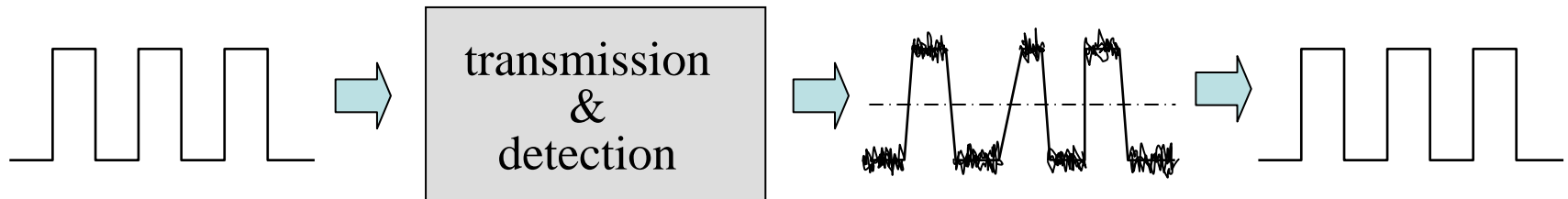
1 0 0 0 0 1 0 0 0 0 1 1 0 1 1 0 0 0 0 0 1 1 0 0 0 1 0 0 0 0 0 1 1 1 0 0 0 0 1

# Digital is robust against noise

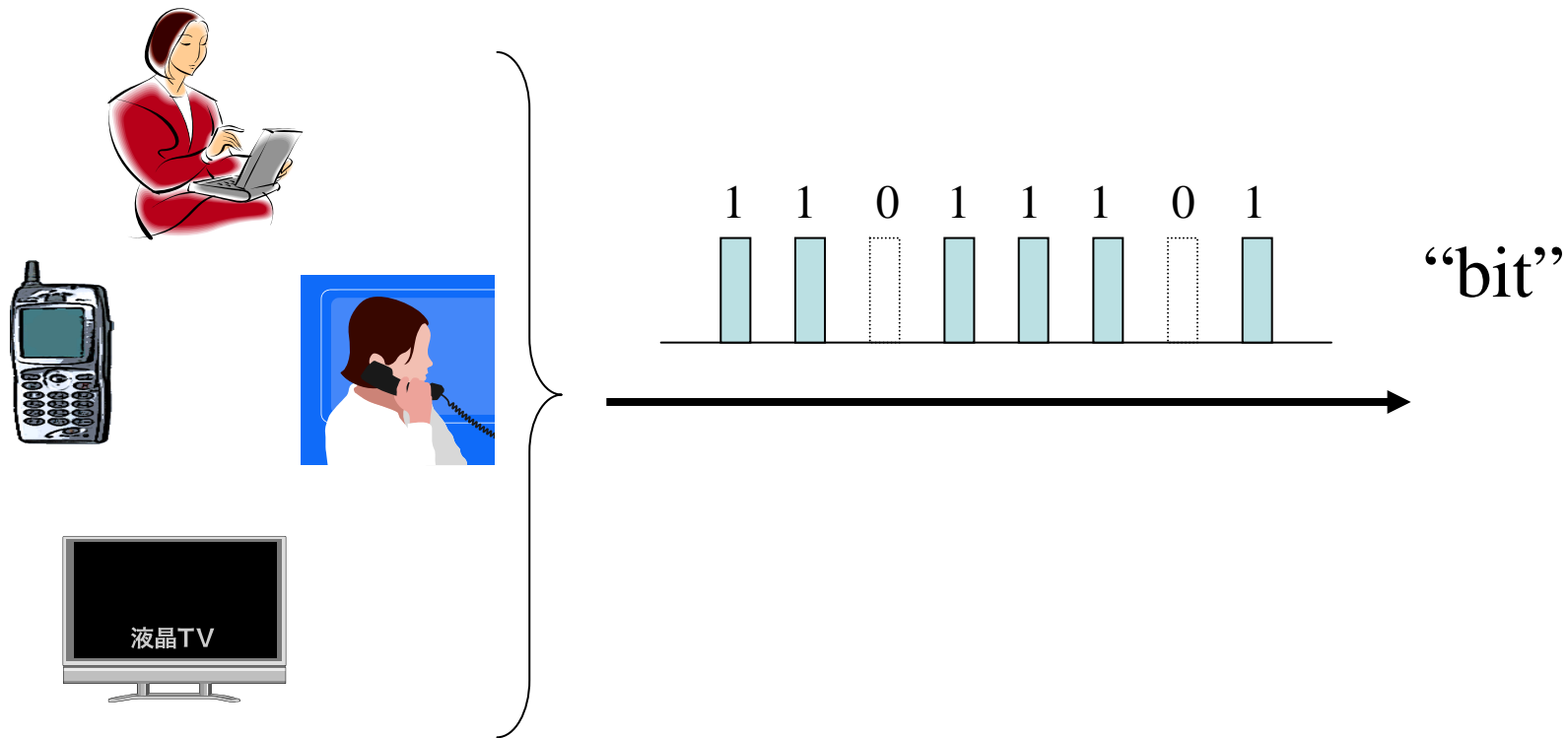
## Analogue



## Digital



# (almost) Everything is digital



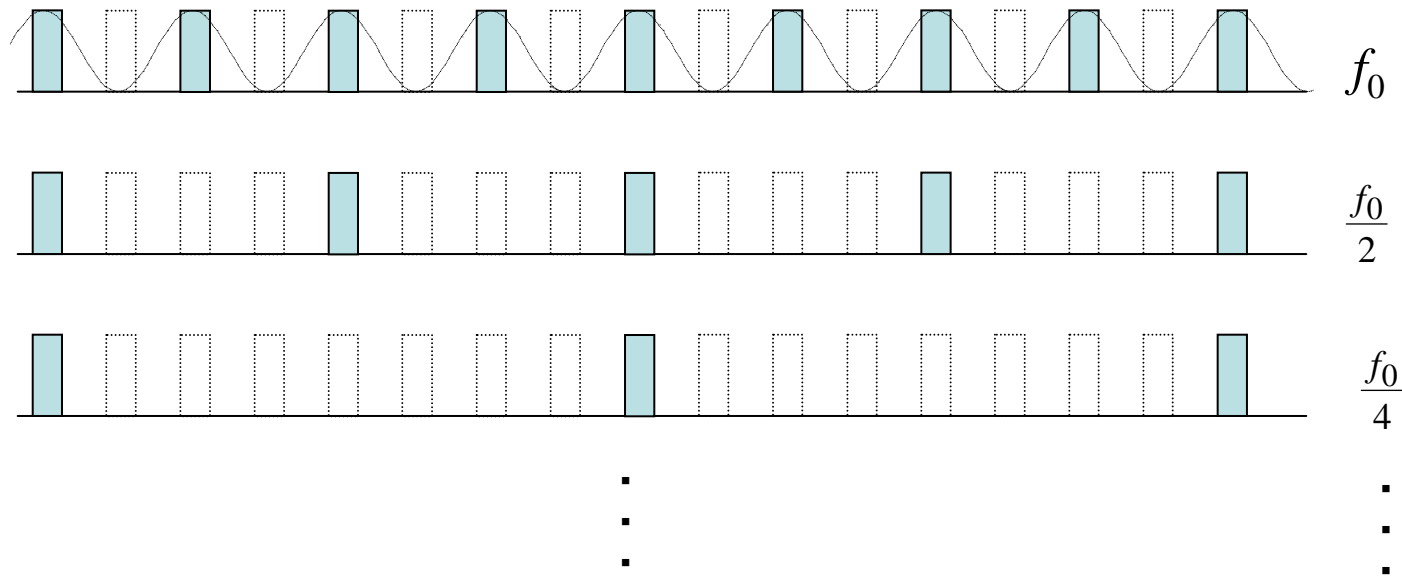
A large number of bits  $\iff$  Large amount of information

A large number of bits per unit time  $\iff$  Large transmission capacity

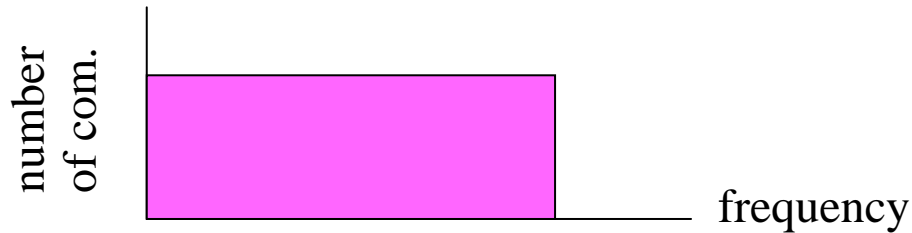
( unit of trans. capacity : bps (bit-per-second) )

# What is “Broad Band” ?

In signal transmission, patterns of a bit sequence are various.



General signal consists of various frequency components.



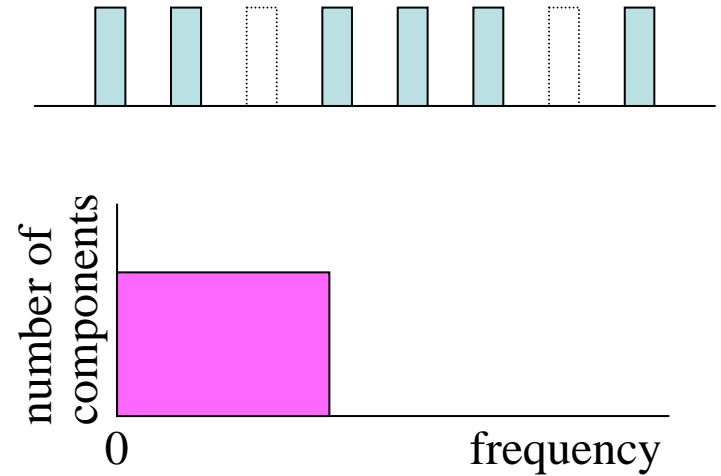
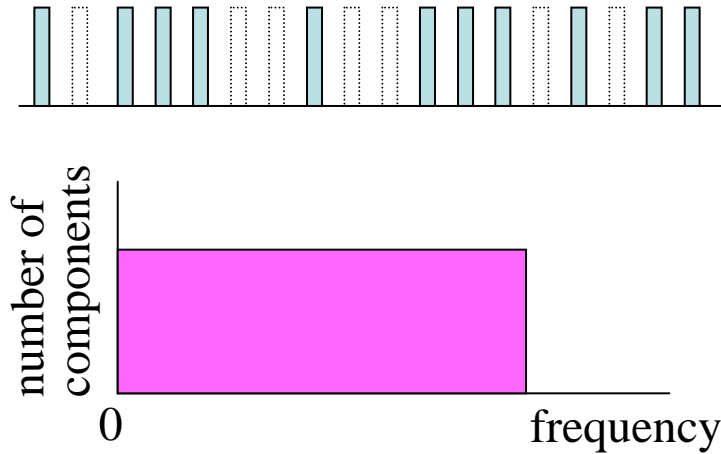
Large transmission capacity = Large bandwidth

**Broadband**



Thus,

a wide frequency band  $\Leftrightarrow$  a large amount of information



Broadband signal

signal having a wide frequency range

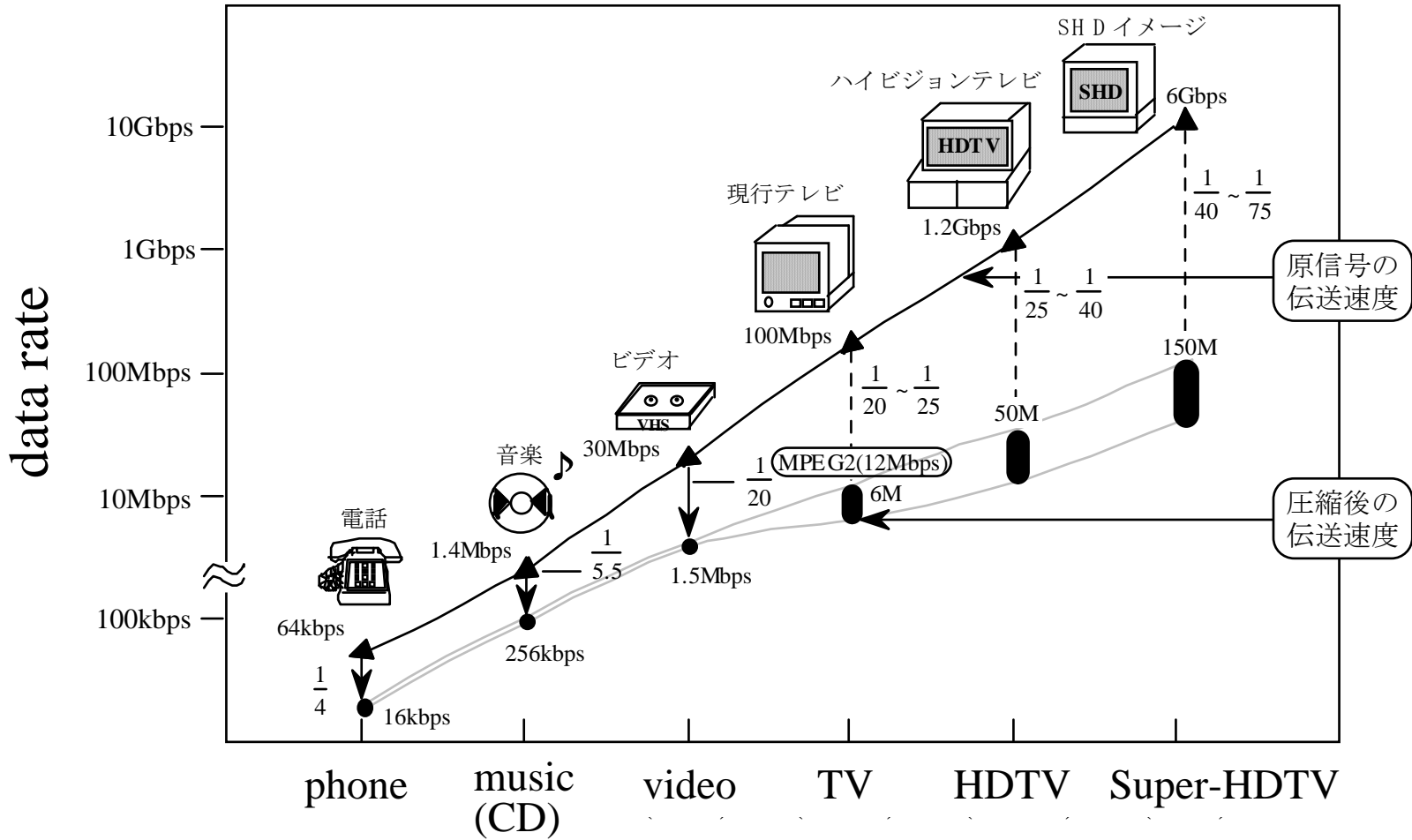
||

signal carrying a large amount of information

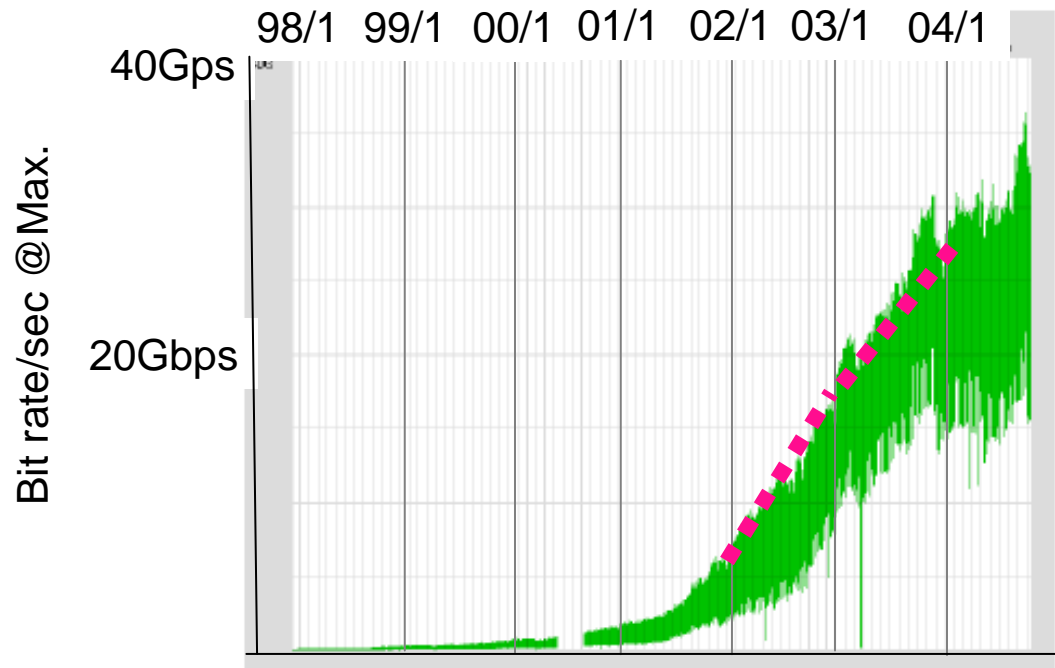
Broadband service

communication service providing a large amount of information

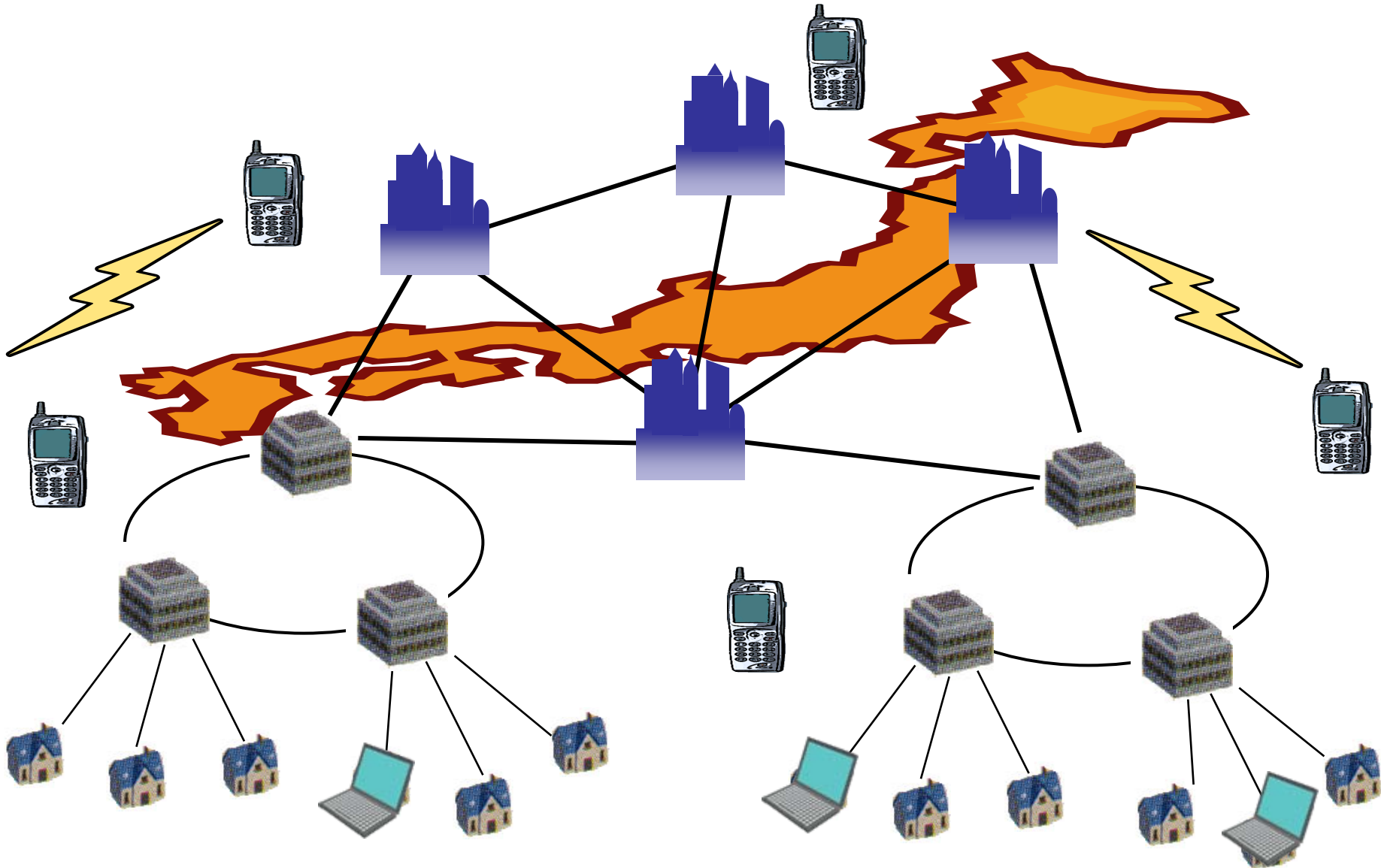
# Data rate is growing.



# Increase in internet traffic



**A large amount of data travel around the world.**



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