

Principles of CDMA, MIMO, OFDM
Wireless comm. systems.

↓
These form the basis for
3G/4G wireless systems.

Evolution of wireless Technologies:

Generation	Technology	Data Rate
2G	GSM	10 Kbps/user
2G	CDMA	10 Kbps
2.5G	GPRS	~ 50 Kbps
2.5G	EDGE	~ 200 Kbps.

~ 1990s

GSM — Global system for Mobile
CDMA — Code Division for Multiple Access
GPRS — General Packet Radio Service
EDGE — Enhanced Data for GSM
Evolution.

3G — 3rd Generation Wireless

~ 2000s	Technology	~ Data Rate
3G	WCDMA/UMTS	~ 384 Kbps.
3G	CDMA 2000	~ 384 Kbps.
3.5G	HSDPA/HSUPA	5 - 30 Mbps.
3.5G	1 EVDO Rev A, B, C	5 - 30 Mbps.

WCDMA — Wideband CDMA
 UMTS — Universal Mobile Telecommunication
 Standard.
 HSDPA — High speed Downlink Packet Access
 EVDO — Evolution Data Optimized.

4G - 4th Generation of wireless

~ 2010s

4G	LTE	100-200 Mbps.
4G	WiMAX	~ 100 Mbps.

LTE - Long Term Evolution

WiMAX — Worldwide Interoperability
for Microwave Access.

Applications in 3G/4G Wireless Systems

Technology	~ Data Rate	Applications
2G 2.5G	10-100 kbps	Voice + Basic Data
3G 3.5G	300 kbps ~ 30 Mbps	Voice, High Speed Data video Calling
4G	> 100 Mbps	Online Gaming, HDTV

{ Data rate increases.
Increase in Reliability.

→ MIMO
OFDM
CDMA }

MIMO: Multiple Input Multiple Output

CDMA: Code Division For Multiple Access

OFDM: Orthogonal Frequency Division Multiplexing.

→ Motivation

→ Details

→ Performance.