

(Mobile)* Radio Networks M – A.Y. 2017/18 – Prof. Roberto Verdone – 6 credits – Second Semester

Learning Outcomes: the student will be aware of the fundamentals of radio networks, covering aspects of the physical, data link and network layers, with specific reference to the evolution of mobile radio systems from GSM to 5G. * The course name will change in A.Y. 2018/19.

INT	Introduction	3/3
INT.1	Radio Networks	1
INT.2	Radio Communication Standards	½
INT.3	Trends	1
INT.4	The Course	½
DTN	Digital Transmission in Noise Limited Systems	13/16
DTN.1	Fundamentals of Digital Communications	1
DTN.2	Communication Link: System Model	½
DTN.3	Energy Efficiency	½
DTN.4	Signal Based Power Control	½
DTN.5	Link Performance (BER) of M-QASK in AWGN	1 ½
DTN.6	Link Adaptation	½
DTN.7	Equalization	½
DTN.8	FEC, ARQ, HARQ	1 ½
DTN.9	Link Performance (BLER) and Capacity in AWGN	½
DTN.10	Radio Resources (Physical Channels)	1
DTN.11	Assignment of Radio Resources	1 ½
DTN.12	Exercises	3
DTN.13	Fundamentals of Digital Communications / 2	½
LRC	Link Level: Radio Channel	9/25
LRC.1	Fundamentals of Radio Propagation / 1	1
LRC.2	Radio Channel Characterization	½
LRC.3	Large Scale Phenomena	½
LRC.4	Small Scale Phenomena	1
LRC.5	Narrowband Mobile Radio Channel	1
LRC.6	Link Performance in the Presence of Fading	½
LRC.7	Gilbert-Elliott Model	½
LRC.8	Area Coverage Probability	1
LRC.9	Exercises	2
LRC.10	Fundamentals of Radio Propagation / 2	1
LCF	Link Level: Countermeasures to Fading	6/31
LCF.1	Interleaving	½
LCF.2	Adaptive Modulation and Coding	½
LCF.3	Diversity	1
LCF.4	Direct Sequence Spread Spectrum	½
LCF.5	Frequency Hopping Spread Spectrum	½
LCF.6	MultiCarrier Modulation	½
LCF.7	Link Performance with FEC and Diversity	1
LCF.8	System Model Revisited	½
LCF.9	Exercises	1
DTI	Digital Transmission in Interference Limited Systems	10/41
DTI.1	Fundamentals of Wireless Networking	½
DTI.1	Communication Link with Interference: System Model	½
DTI.2	Interference Based Power Control	½
DTI.3	Linear and Non Linear Demodulation	½
DTI.4	Link Performance (BER) of M-QASK with Interference	1
DTI.5	Capture Effect	½
DTI.6	Direct Sequence Spread Spectrum with interference	1
DTI.7	Link Level Outage Probability with Fading and Interference	1
DTI.8	Impact on Interference of Countermeasures to Fading	1
DTI.9	Interference Based Power Control from a Network Level viewpoint	1 ½
DTI.10	Exercises	2
RRA	Radio Resource Assignment in Cellular Networks	6/47
RRA.1	Cellular Networks	2
RRA.2	Reuse	1
RRA.3	RANs: Network Spectrum Efficiency	1
RRA.4	Cluster Size Dimensioning	1
RRA.5	Exercises	1
RRM	Network Level: Radio Resource Management	6/53
RRM.1	RRM techniques	1 ½
RRM.2	Scheduling	2
RRM.3	Hard and Soft Handover	1 ½
RRM.4	Admission Control, Load Control	1
MRN	Mobile Radio Networks	12/65
MRN.1	Network Architectures: Evolution From GSM towards 5G	3
MRN.2	Mobility Management	½
MRN.3	2G (GSM): Numerology	½
MRN.4	2G (GSM): MAC and RLC	1
MRN.5	2G (GSM): Measurement Reports	1
MRN.6	2.5G (GPRS)	½
MRN.7	2.5G (EDGE)	½
MRN.8	3G (UMTS): Numerology	1
MRN.9	3.5G (HSPA)	½
MRN.10	LTE: Numerology	1
MRN.11	LTE: MAC and RLC	1
MRN.12	4G (LTE-A)	½
MRN.13	NB-IOT	1