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A Study on Radio Access Technology Selection Algorithms

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Preface

The next generation wireless network is envisioned to be heterogeneous, where different Radio Access Technologies (RATs) coexist in the same coverage area. A major challenge of the heterogeneous network is the Radio Resource Management (RRM) strategy. Common RRM (CRRM) was proposed in the literature to jointly manage radio resources among different RATs in an optimized way. This book discusses the basic idea of CRRM, especially on the RAT selection part of CRRM. Two interaction functions (information reporting function and RRM decision support function) and four interaction degrees (from low to very high) of CRRM are introduced. Four possible CRRM topologies (CRRM server, integrated CRRM, Hierarchical CRRM, and CRRM in user terminals) are described. Different RAT selection algorithms, including single criterion and multiple criteria-based algorithms are presented and compared. Their advantages and disadvantages are analyzed.

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Abbreviations

1G	First generation
2G	Second generation
3G	Third generation
3GPP	3rd generation partnership project
4G	Fourth generation
AC	Admission control
APC	Access point controllers
ATLB	Adaptive threshold load balancing
BLER	BLock error rate
BLJRRME	Base layer joint radio resource management entity
BS	Base station
BSC	Base station controller
CA	Collision avoidance
CBR	Constant bit rate
CC	Congestion control
CN	Core network
CRRM	Common radio resource management
CSMA	Carrier sense multiple access
DR	Direct retry
FDMA	Frequency division multiple access
FSD	Fuzzy selected decision
GERAN	GSM/EDGE radio access network
GPRS	General packet radio service
GSM	Global system for mobile communication
HC	Handover control
HO	Handover
HSDPA	High speed downlink packet access
HSPA	High speed packet access
HSUPA	High speed uplink packet access
JRRM	Joint radio resource management
IN	Indoor

LB	Load balancing
LTE	Long term evolution
MADM	Multiple attribute decision making
MCDM	Multi-criteria decision making
MCS	Modulation and coding scheme
MODM	Multiple objective decision making
MRRM	Multi-access radio resource management
MS	Mobile station
NCCB	Network controlled cell breathing
NRT	Non-real time
OSM	Operator software module
PC	Power control
PS	Packet scheduling
QoS	Quality of service
RAT	Radio access technology
RNC	Radio network controller
RRM	Radio resource management
RRME	RAT resource management entity
RRU	Radio resource unit
RT	Real time
SIR	Signal to interference ratio
SMD	Semi-Markov decision
TDMA	Time division multiple access
UE	User equipment
ULJRRME	Upper layer joint radio resource management entity
UMTS	Universal mobile telecommunications system
USaBS	User satisfaction-based selection
USaLOR	User satisfaction with low resources selection
USM	User software module
UT	User terminal
UTRAN	Universal terrestrial radio access network
VG	Voice GERAN
VHO	Vertical handover
VoIP	Voice over IP
VU	Voice UTRAN
WCDMA	Wideband code division multiple access
WLAN	Wireless local area network
WMAN	Wireless metropolitan area network
WWAN	Wireless wide area network