

TABLE OF CONTENTS

LIST OF FIGURES.....	4
I. INTRODUCTION & KEY FINDINGS.....	5
1.1 Key Findings.....	6
1.2 Report Scope & Structure	7
II. THE PACKET BACKHAUL TRANSITION: THE STORY SO FAR.....	8
2.1 Mobile Backhaul in the Context of Network-Wide IP Transformation.....	9
2.2 The Lack of Industry Consensus on Key Aspects of LTE Backhaul	11
III. KEY DESIGN ASSUMPTIONS FOR LTE BACKHAUL	12
3.1 Planning Assumptions: Cell Site Size & Proliferation.....	13
3.2 Planning Assumptions: Voice Over LTE	14
3.3 Planning Assumptions: Transport Features in eNodeBs.....	14
IV. TOPOLOGY & PROTOCOL OPTIONS.....	16
4.1 Unprecedented Levels of Industry Collaboration	16
4.2 Uses for the S1 & X2 Interfaces	17
V. SECURING THE BACKHAUL IN LTE	19
5.1 Guidance From 3GPP	19
5.2 IPsec in the Backhaul: The Case Against	20
5.3 IPsec in the Backhaul: The Case For.....	21
5.4 Operator Perspectives on Using IPsec	23
VI. SYNCHRONIZATION REQUIREMENTS IN LTE	24
6.1 New Frequency Synchronization Techniques Are Seeing Slow Traction	24
6.2 Industry Roadmaps for Supporting Time/Phase Synchronization.....	26
6.3 Time/Phase Synchronization: Mandatory or Optional?	26
6.4 The Future of GPS & Other Regional GNSS Networks	27
6.5 A Comprehensive Approach to Synchronization for LTE	28
6.6 T-Mobile Case Study.....	29
VII. DISTRIBUTION OF CORE INTELLIGENCE INTO THE BACKHAUL.....	30
VIII. VERIZON WIRELESS'S BACKHAUL FOR CDMA & LTE	32
IX. VENDOR PROFILES.....	36
9.1 Accedian Networks Inc.....	36
9.2 Actelis Networks Inc.....	36
9.3 Adtran Inc.....	36
9.4 ADVA Optical Networking	37
9.5 Alcatel-Lucent.....	37

IX. VENDOR PROFILES (CONTINUED)

9.6	ANDA Networks Inc.....	38
9.7	Aviat Networks Inc.....	39
9.8	Axerra Networks Inc.....	39
9.9	BridgeWave Communications Inc.	40
9.10	Brilliant Telecommunications Inc.....	40
9.11	Calix Networks Inc.....	40
9.12	Celtro Inc.	40
9.13	Ceragon Networks Ltd.....	41
9.14	Ciena Corp.	41
9.15	Cisco Systems Inc.....	42
9.16	Cyan Optics Inc.	42
9.17	DragonWave Inc.....	43
9.18	ECI Telecom Ltd.....	44
9.19	Ericsson AB.....	44
9.20	Fujitsu Ltd.....	45
9.21	Hatteras Networks Inc.	45
9.22	Huawei Technologies Co. Ltd.	45
9.23	JDS Uniphase Corp.....	45
9.24	Juniper Networks Inc.....	46
9.25	MRV Communications Inc.....	46
9.26	NEC Corp.	46
9.27	Nera Networks AS.....	47
9.28	Nokia Siemens Networks	47
9.29	Overture Networks	48
9.30	RAD Data Communications Ltd.	48
9.31	Siklu Inc.....	48
9.32	Symmetricom Inc.....	48
9.33	Tellabs Inc.	49
9.34	Transmode Systems AB.....	49
9.35	ZTE Corp.....	50
APPENDIX A: ABOUT THE AUTHOR.....		51
APPENDIX B: LEGAL DISCLAIMER		52