

# Dedication

To my Parents and My Wife with  
love

Anwer

# Acknowledgement

I would like to express my gratitude to my supervisor; Dr.Yahia Abdallah Without his help and support this thesis would not be completed. It was under his esteemed guidance, which made this challenging project look so effortless. Whenever I needed some help, he was always there to help me out.

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## ملخص الاطروحة

تعتبر شركة أرياب من الشركات الكبرى الرائدة في مجال التعدين في السودان حيث يوجد مقرها الرئيسي في الخرطوم وتوجد حقول تعدينها بتلال البحر الأحمر شرق السودان وهى عبارة عن منطقة ريفية تفتقر لخدمات الاتصالات، ومن هنا ظهرت مشكلة عدم تبادل المعلومات والاتصال بين مكاتب الرئاسة وحقول التعدين لدى شركة أرياب.

لقد تمت دراسة عدد من حلول الشبكات التي تعمل على بيئة الإتصالات بالسودان لإختيار الحل الامثل لربط مكاتب رئاسة الشركة مع حقل تعدينها الموجود في أقصى شرق السودان والواقع خارج نطاق خدمة شركة الاتصالات (سوداتل) ، و كان التحدي فى إيجاد وسيلة لربط حقل التعدين بأقرب منطقة يمر بها خط الالياف الضوئية، وبهذا نكون قد تمكنا من ربط حقل التعدين بمكاتب الرئاسة بواحد من حلول شبكات الاتصال المستقرة و التي تعمل بكفاءة عالية وباقل تكلفة .

وبعد دراسة جميع حلول الشبكات المتوفرة في السوق العالمي والملائمة لبيئة السودان قمنا باختيار حل شركة موتورلا وهو عبارة عن شبكة إتصال لاسلكي يسمى بـ(Canopy Ethernet Bridge) والذي يعمل لمسافات بعيدة تتجاوز 200 كيلومتر وبكفاءة عالية لنقل البيانات لأكثر من 20 ميغابت في الثانية، وكذلك يعمل بثلاثة طرق لارسال الاشارات (LOS,nLOS,NLOS) وذلك بفضل تقنية الـ(OFDM) الذي يستخدمها هذا الحل .

و بعد دراسة متأنية قمنا بتطبيق حل شركة موتورلا اللاسلكي بين نقطتين لاختبار كفاءة ومقدرة للعمل في هذه البيئة الصعبة التضاريس وذلك باستخدام برنامج المحاكاة (PTP LinkPlanner) وكانت النتائج ممتازة .

بناءً على النتائج التي تم التوصل اليها والتي قد لبت إحتياجات الشركة ، عليه نوصي بتطبيق الحل الذي تم أختراره، ومن ثم نشره على بقية الحقول .

# Abstract

AMC is the greatest company in mining filed in Sudan, whereas the HQ-Office located in Khartoum and there mine fields located in rural area in Red Sea Hills in most eastern of Sudan which it is out of range of telecommunication company (Sudatel), so there will not be any exchange of information and communication between AMC-HQ office and mine filed.

Our Challenge is to find the nearest location from AMF site that fiber optic cross it to connect AMF site , so an AMC-HQ office will be connected with AMF with an optimal and capable solution with low cost.

After studying all the network solutions available in the world market, we choose a wireless solution called Canopy Ethernet Bridge from Motorola which is suitable for the AMC connectivity case, this product work for long distance greater than 200 km and give high throughput between 1 up to 20 Mbps, it also sends signals by three methods (LOS, nLoS, NLOS) because it is using an OFDM technology.

This solution was implemented by using Simulation software called PTP linkPlanner to ensure the efficiency and capability of Motorola PTP wireless solution for AMC before real implementation, it give us an excellent result.

On the basis of the obtained results which meet the AMC requirements we recommend to implement this solution and deploy it for other fields.

# Table of Contents

Dedication		I
Acknowledgement		II
Arabic Abstract		III
Abstract		IV
Table of contents		V
Table of tables		VIII
Table of figures		IX
<b>Chapter One</b>	<b>Introduction</b>	1
1.1	The Ariab Mining Company Ltd. Overview	1
1.2	AMC Problem Background	1
1.3	Objective	1
1.4	Research Problem	2
1.5	Methodology	2
1.6	Thesis Organization	3
<b>Chapter Two</b>	<b>The Bandwidth Required for AMC</b>	4
2.1	Introduction	4
2.2	AMC Requirements	4
2.3	Bandwidth Required for AMC Applications	4
2.3.1	Video Conference	4
2.3.2	Voice over Internet Protocol (VoIP)	5
2.3.3	Internet and E-mail Services	6
2.3.4	ERP Application	6
2.4	Comparison Bandwidth between Wired & Wireless Network Technologies	6
2.5	Traditional Network Won't Work to AMC Case	8
<b>Chapter Three</b>	<b>Available Wired &amp; Wireless Connections Solution for AMC</b>	11
3.1	Introduction	11
3.2	Broadband Cellular	11
3.2.1	Global System for Mobile Communication	11
3.2.1.1	The GSM Network	12
3.2.1.1.1	The Switching System	13
3.2.1.1.2	The Base Station System (BSS)	14
3.2.1.1.3	The Operation and Support System	14
3.2.1.2	GSM Specifications	14
3.2.1.3	GSM Subscriber Services	16
3.2.1.4	GSM TOPOLOGY	17
3.2.1.5	GPRS (2.5G Network)	18

3.3	Code Division Multiple Access (CDMA)	18
3.3.1	Coverage and applications	20
3.3.2	CDMA Is Efficient	21
3.3.3	Spread Spectrum	21
3.3.4	A Different Kind of Chip	22
3.3.5	More Secure	22
3.3.6	How the Technology Works	22
3.3.6.1	Transmitting from the Base Station	22
3.3.6.2	Receiving at the Cell-phone	24
3.3.6.3	Follow the Single Bit Example	25
3.3.7	The Difference between GSM and CDMA	25
3.4	Fiber Optics Networks	28
3.4.1	Fiber Optic Networks	30
3.4.2	Designing Cable Networks	31
3.4.3	Copper Really Cheaper Than Fiber	32
3.4.4	Fiber Uses	32
3.4.5	Fiber Performance Specifications	33
3.4.6	Fiber Optics Types	35
3.5	WiMAX	35
3.5.1	Technical overview	36
3.5.2	Uses for WiMAX	37
3.5.3	WiMAX Definitions	37
3.5.4	WiMAX Connectivity and Solutions	39
3.5.5	WiMAX Working	39
3.5.6	Applications	41
3.5.7	System Performance	43
3.6	Radio Frequency-RF	43
3.6.1	Using Radio Waves to Carry Wireless Data Transmissions	45
3.6.2	How Radio Waves Transport Data Information over Different Frequencies	45
3.6.3	Summary RF Works	47
3.7	Satellite Wireless Communications	48
3.8	DSL	54
3.9	Motorola Canopy	57
3.10	WiFi	61
<b>Chapter Four</b>	<b>Case Study</b>	66
4.1	introduction	66
4.2	Outlook for Ariab Mine Filed and Solutions	66
4.3	Solution Objective	67
4.4	Solution Overview	67
4.5	The Steps Needed to Plan and Build Wireless Network	69

	Solution for AMC	
4.5.1	Physical Site Survey	69
4.5.2	Wireless Site Survey	70
4.5.3	Planning Wireless Cell Sites	70
4.5.4	Contracting Space on Existing Cell Towers	71
4.5.5	Assessing Broadband Demand in Target Coverage Area	71
4.5.6	Building a Business Plan	71
4.5.7	Building Announcement Services Plan	71
4.5.8	Wireless Training for Proper Engineering Principles	72
4.5.9	Planning for Proactive Network Management	72
4.5.10	Planning for Superior Employee Technical Support	72
4.6	Motorola Point-to-Point 500 Series Wireless Ethernet Bridges Solution	73
4.6.1	Canopy Ethernet Bridge Solution technical specification	80
4.6.2	Working of Canopy Solution on AMC Network	82
4.6.3	Action Plan for Software and Hardware	83
4.7	The Scenario of Implementation	84
<b>Chapter five</b>	<b><u>Results and Discussion</u></b>	85
5.1	introduction	85
5.2	Implementation Methods	85
5.2.1	Determination of the coordinates	85
5.2.2	Canopy Ethernet Bridge PTP Series 500	86
5.2.3	Simulation software (PTP LinkPlanner)	87
5.3	Steps of Simulation PTP Testing	87
5.3.1	Creating Project, Sites and Link	88
5.3.2	Updating Profile with Obstructions	91
5.3.3	Adjusting Configuration and Requirements	94
5.4	Results and Discussion	97
5.4.1	Performance Summary	97
5.4.2	Performance Details	99
5.4.2.1	Common Details	100
5.4.2.2	Performance to each end	100
5.5	Equations for Path Loss, Link Loss and Fresnel Zone	102
5.5.1	Path loss Equation	102
5.5.2	Link loss	102
5.5.3	Fresnel Zone	103
5.6	Network Description	107
<b>Chapter Six</b>	<b><u>Conclusion and Recommendation</u></b>	103
6.1	Conclusion	109
6.2	Recommendation and Future Works	110
<b>References</b>		111

<b>Appendix</b>		113
<b>A</b>	Glossary	113
<b>B</b>	PTP LINKPlanner Real Configuration Worksheet Implementation for Petrodar Project	118



# Table of tables

Table No.	List of tables	Page No.
1	AMC Applications Bandwidth Required	6
2	Fiber types and typical specifications	33
3	Network Technology Economical and Technical Feasibility study for AMC Case	65
4	Technical specification for Motorola 5.4 and 5.8 GHz wi4 Fixed Point-To-Point Bridges – PTP 500 Series	81

# Table of Figures

Figure No.	List of figures	Page No.
1	Wireless technology Data Rate	8
2	GSM Network Elements	12
3	GSM Network Architecture	17
4	Transmitting CDMA	23
5	Receiving CDMA	24
6	Fiber Optic	29
7	Designing Cable Networks	32
8	Fiber Performance Specifications	34
9	WiMAX Works	41
10	Deployment Scenarios for WiMAX	42
11	Wireless Digital Communication System (Transmitter)	44
12	Wireless Digital Communication System (Receiver)	44
13	The Satellite	48
14	Satellite Dish	50
15	Desktop and Satellite modem	52
16	DSL Frequencies	55
17	DSL Modem	55
18	DSLAM Cabinet	56
19	DSL Network	56
20	Canopy Modules	58
21	Canopy Network	59
22	The position of two sites and distance between them	69
23	The main pieces of Canopy PTP 500 infrastructure	78
24	IEEE 802.16 Wireless Traffic Movements in AMC Network	81
25	AMC Network design Based on Canopy Ethernet bridge & 802.11(WLAN)	82
26	Basic Architecture of MAN's Intranet/Extranet Solution	83
27	The two sites coordinate and distance between them	85
28	Inserting Site 1	87
29	Inserting Site 2	88
30	Inserting Link	88
31	Requesting Profiles	89
32	Link Equipment	89
33	Performance Summary	90
34	Path Profile	90

35	Profile Editor	91
36	Profile Visualization Chart (NLOS 58.3 km)	91
37	Adjust One End of Link at Rojal	92
38	Adjust Other End of Link at AMF	93
39	Performance Unacceptable at One End	93
40	Performance Unacceptable at Other End	93
41	Adjust One End of Link Again	94
42	Adjust Other End of Link Again	94
43	Performance Acceptable at One End	94
44	Performance Acceptable at Other End	95
45	Performance Summary	95
46	Performance Details	97
47	Overhead View of Testing Area	99
48	Image of Rojal Site (Ariab BS)	99
49	Image of AMF Site (Ariab SS)	100
50	The Proposed AMC Network Diagram	100
51	Hypothetical AMC Wireless Network Diagram	101
52	PTP LinkPlanner Flow Chart	104
53	Overhead View of Testing Area	105
54	Image of Rojal Site (Ariab BS)	105
55	Image of AMF Site (Ariab SS)	106
56	The Proposed AMC Network Diagram	106
57	Hypothetical AMC Wireless Network Diagram	107