#### **Building BT Network**

by
Zhihao DAI
Yunsong ZHANG
Huijing LEI
Changrong CHEN
Yan HUANG

# ${\bf 19COP502~Building~Secure~Networks} \\ {\bf Lab~Report}$

Loughborough University

 $\odot$  BT NETWORK 2019

Nov. 2019

## Abstract

TODO

#### CONTENTS

## Contents

Abstract										
List of Tables										
	1.1	Netwo	ork Services	1						
	1.2	Busine	ess Relationships with Neighbor ISPs	1						
		1.2.1	Provider: Central Network	1						
		1.2.2	Peer: Virgin Network	1						
		1.2.3	Customer: DT Network	1						
	1.3	Roles	of Network Components	1						
		1.3.1	Routers	1						
		1.3.2	Laptops	1						
2	Arc	hitecti	ure	2						
	2.1	Netwo	ork Diagram	2						
		2.1.1	Description	2						
		2.1.2	IP Addresses and Interfaces	2						
		2.1.3	Connections to Neighbor ISPs	2						
	2.2	IP Ad	dresses of Interfaces	2						
		2.2.1	Design	2						
		2.2.2	Implementation	2						
		2.2.3	Evaluation	2						
		2.2.4	Commentary	2						
	2.3	Secure	e Remote Access to Routers through SSH	2						
		231	Design	2						

#### ${\tt CONTENTS}$

		2.3.2	Implementation	. 2						
		2.3.3	Evaluation	. 2						
		2.3.4	Commentary	. 2						
3	Rou	uting Protocols in the Network 3								
	3.1	Intra-	domain Routing Protocol: ISIS	. 3						
		3.1.1	Design	. 3						
		3.1.2	Implementation	. 3						
		3.1.3	Evaluation	. 3						
		3.1.4	Commentary	. 3						
	3.2	Inter-o	domain Routing Protocol: BGP	. 3						
		3.2.1	Design	. 3						
		3.2.2	Implementation	. 3						
		3.2.3	Evaluation	. 3						
		3.2.4	Commentary	. 3						
4	App	olicatio	ons in the Network	4						
	4.1	World	l Wide Web Service	. 5						
		4.1.1	Design	. 5						
		4.1.2	Implementation	. 5						
		4.1.3	Evaluation	. 5						
		4.1.4	Commentary	. 5						
	4.2	DNS S	Service	. 5						
		4.2.1	Design	. 5						
		4.2.2	Implementation	. 5						
		4.2.3	Evaluation	. 5						
		4.2.4	Commentary	. 5						
	4.3	Email	Service	. 5						
		4.3.1	Design	. 5						
		4.3.2	Implementation	. 5						
		4.3.3	Evaluation							
		4.3.4	Commentary	. 5						
5	Disc	cussion	$\mathbf{n}$	6						
	5.1	Concl	usions	. 6						
	5.2	Furthe	er Work	. 6						

#### ${\tt CONTENTS}$

6	Contributions				
	6.1	Group Leader: Zhihao DAI	7		
	6.2	Technical Director: Yunsong ZHANG	7		
	6.3	Network Engineer: Huijing LEI			
	6.4	Network Engineer: Changrong CHEN	7		
	6.5	Network Engineer: Yan HUANG			
R	efere	nces	8		
$\mathbf{A}$	Rou	nters Configuration	9		
	A.1	Router 1 Configuration	9		
	A.2	Router 2 Configuration	9		
	A.3	Router 3 Configuration	9		
В	Lap	tops Configuration	10		
	B.1	Laptop 1 Configuration	10		
	B.2	Laptop 2 Configuration	10		
	В.3	Laptop 3 Configuration	10		

# List of Figures

## List of Tables

#### Introduction

- 1.1 Network Services
- 1.2 Business Relationships with Neighbor ISPs
- 1.2.1 Provider: Central Network
- 1.2.2 Peer: Virgin Network
- 1.2.3 Customer: DT Network
- 1.3 Roles of Network Components
- 1.3.1 Routers
- 1.3.1.1 Router 1: iBGP
- 1.3.1.2 Router 2: eBGP
- 1.3.1.3 Router 3: eBGP
- 1.3.2 Laptops
- ${\bf 1.3.2.1} \quad {\bf Laptop~1:~Secondary~DNS~Server,~SSH~Access~Point}$
- 1.3.2.2 Laptop 2: User
- 1.3.2.3 Laptop 3: Primary DNS Server, Webserver, Email Server

#### Architecture

2.1	Network	Diagram

- 2.1.1 Description
- 2.1.2 IP Addresses and Interfaces
- 2.1.3 Connections to Neighbor ISPs

#### 2.2 IP Addresses of Interfaces

- 2.2.1 Design
- 2.2.2 Implementation
- 2.2.3 Evaluation
- 2.2.4 Commentary

#### 2.3 Secure Remote Access to Routers through SSH

- 2.3.1 Design
- 2.3.2 Implementation
- 2.3.3 Evaluation
- 2.3.4 Commentary

# Routing Protocols in the Network

- 3.1 Intra-domain Routing Protocol: ISIS
- 3.1.1 Design
- 3.1.2 Implementation
- 3.1.3 Evaluation
- 3.1.4 Commentary
- 3.2 Inter-domain Routing Protocol: BGP
- 3.2.1 Design
- 3.2.2 Implementation
- 3.2.3 Evaluation
- 3.2.4 Commentary

#### CHAPTER 4. APPLICATIONS IN THE NETWORK

# Applications in the Network

- 4.1 World Wide Web Service
- 4.1.1 Design
- 4.1.2 Implementation
- 4.1.3 Evaluation
- 4.1.4 Commentary
- 4.2 DNS Service
- 4.2.1 Design
- 4.2.2 Implementation
- 4.2.3 Evaluation
- 4.2.4 Commentary
- 4.3 Email Service
- 4.3.1 Design
- 4.3.2 Implementation
- 4.3.3 Evaluation
- 4.3.4 Commentary

### Discussion

- 5.1 Conclusions
- 5.2 Further Work

#### Contributions

- 6.1 Group Leader: Zhihao DAI
- 6.2 Technical Director: Yunsong ZHANG
- 6.3 Network Engineer: Huijing LEI
- 6.4 Network Engineer: Changrong CHEN
- 6.5 Network Engineer: Yan HUANG

## References

### Appendix A

# **Routers Configuration**

- A.1 Router 1 Configuration
- A.2 Router 2 Configuration
- A.3 Router 3 Configuration

### Appendix B

# Laptops Configuration

- **B.1** Laptop 1 Configuration
- B.2 Laptop 2 Configuration
- **B.3** Laptop 3 Configuration