TCOM610 Sec 001 & DL2 – IP Routing – BGP Protocol
Department of Electrical and Computer Engineering
George Mason University
Spring, 2014

Course Description
This is one of the main courses on IP routing protocol series designed to teach the current
state of the art for Internet routing. The course covers Internet evolution, RFC
specifications for BGP routing and its extensions, vendor BGP implementation and
configuration syntax, and routing policy and implementation in enterprises and Internet
service providers networks (ISP). The topics includes BGP4 standards, BGP protocol
states, BGP routing attributes, BGP decision algorithm, route-reflectors and AS
confederations (iBGP), BGP routing policy, traffic load-balancing and routing
redundancy, BGP dampening, MP-BGP, L2-/L3-VPN with MPLS and BGP
convergence.

Prerequisites
Students must finish at least TCOM509, TCOM514/515 equivalence before taking this
class. TCP/IP protocols, IP routing basics, and IP addresses knowledge are assumed.
Students are also recommended to take IGP routing course (TCOM609) before or after
taking this BGP course.

Location & Time
Fairfax Campus, University Hall Rm1204, Thursday, 7:20-10:00PM,
Online – Blackboard Collaborate, Thursday, 7:20-10:00PM,
Jan 23 – May 8, 2014

Instructor
Tawfiq Khan tkhan5@gmu.edu
Office Hour: By email, or by appointment only

Textbooks
Internet Routing Architectures 2nd Edition, Sam Halabi, Danny McPherson, 2nd Edition,
ISBN 1-57870-233-X, 2000, Cisco Press

References
1. Advanced BGP Design and Implementation by Randy Zhang, Micah Bartell, Cisco
Press,1st edition (December 22, 2003) ISBN: 1587051095

2. Routing TCP/IP, Volume II (CCIE Professional Development)
by Jeff Doyle, Jennifer DeHaven Carroll, Cisco Press; 1st edition, April 11, 2001, ISBN:
1578700892

3. BGP, O'Reilly & Associates; 1st edition (September 11, 2002) ISBN: 0596002548

4. RFCs: http://www.ietf.org, RFC4271-BGP4, RFC4456-BGP-RR, RFC4360-extCommunity, RFC4364-MPLS/VPN

5. NANOG Slides: http://www.nanog.org

6. BGP Online Resources: http://www.bgp4.as/, http://www.cisco.com http://www.juniper.net

Grading and Projects

There will be one mid-term exam and one final exam. All exams are closed book. There will be one individual project. Students are required to submit the project to the instructor prior to the due date electronically. Late projects will not be accepted unless the prior permission has been granted. Your final course graded will be calculated as follows:

Mid-term	25%
Final Exam	30%
Project	35%
HW	10%

Schedule

Week1 1/23 Overview of TCP/IP, IP routing and addressing (AddressingIPRouting.ppt; Chapters 1, 3 Some topics not in book)

Week2 1/30 BGP protocol specification, configuration and BGP attributes RFC4271 (BGPBasic.ppt; Chapters 4~5)

Week3 2/6 BGP Decision process and BGP Policy (BGPPolicy.ppt Chapter 6)

Week4 2/13 BGP Redundancy and Load balancing, BGP Case Study (AdvancedBGPPolicy.ppt; Chapter 7)

Week5 2/20 BGP Scaling: IBGP, Route-reflectors and AS confederations (IBGPPolicy.ppt; Chapters 8~9)

Week6 2/27 Mid-Term prep discussion and formal introduction of BGP Project

Week7 3/6 **Mid-term**

3/13 *** No classes: Spring Break March 10 – March 14 ***

Week8 3/20 Mid Term review, and project discussion

Week9 3/27 ISP Services design and Peering (ISPServiceNTroubleshooting.ppt; Some topics in chapter Chapter 2)

Week10 4/3 BGP extension: capacity, refresh, BGP security (BGPSecurity.ppt; BGPExtensions.pptNot in book)

Week11 4/10 BGP convergence, route dampening and performance tuning (BGPConvergance.ppt; Some topics in chapter 10)

Week12 4/17 MPLS and L2/L3 VPN Architecture (MP-BGP.ppt; Not in book)

Week13 4/24 Project discussion

Week14 5/1 Final Review, Project discussion *****Project Due*****

Week 15 5/8 **Final Exam**

NOTE: Chapters references are for the Sam Halabi book: Internet Routing Architectures)