TCOM610 Sec 001 – Multi Protocol BGP Routing
Department of Electrical and Computer Engineering
George Mason University
Spring, 2021

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
Online – Blackboard Collaborate, Thursday, 7:20-10:00PM,
Jan 28 – May 10, 2018

Instructor
Tawfiq Khan tkhan5@gmu.edu
Office Hour: By email, or by appointment only
Phone: 571-425-1657

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

Week 1 1/28 Overview of course, grading policy, Exams, Homework, and Course Project, (AddressingIPRouting.ppt

Week 2 2/4 Continue BGP Basics Part I: BGP protocol specification, (BGPBasics_partI.ppt; Chapters 4~5)

Week 3 2/11 BGP Basics Part II: BGP attributes RFC4271 and configuration (BGPBasics_partII.ppt; Chapters 4~5)

Week 4 2/18 BGP Decision process and BGP Policy (BGPPolicy.ppt Chapter 6)

Week 5 2/25 BGP Redundancy and Load balancing, BGP Case Study (AdvancedBGPPolicy.ppt; Chapter 7)

Week 6 3/4 BGP Scaling: IBGP, Route-reflectors and AS confederations (IBGPPolicy.ppt; Chapters 8~9); Mid-Term Exam study guide and formal introduction of BGP Project

Week 7 3/11 **Mid-term Exam**

3/18* No classes: Spring Break March 15 – March 21 ***

Week 8 3/25 Mid Term review, and project discussion

Week 9 4/1 ISP Services design and Peering (ISPServiceNTroubleshooting.ppt; Some topics in chapter Chapter 2)

Week 10 4/8 BGP extension: capacity, refresh, BGP security (BGPSecurity.ppt; BGPExtensions.ppt; Not in book)

Week 11 4/15 BGP convergence, route dampening, performance tuning (BGPConvergance.ppt; Some topics in chapter 10)

Week 12 4/22 MPLS and L2/L3 VPN Architecture (MP-BGP.ppt; Not in book)

Week 13 4/29 Project discussion

Week 14 5/6 Final Exam study guide, Project discussion *****Project Due*****

Week 15 5/13 **Final Exam**

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