

# ETH 405G

## Advanced Enterprise Networking

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The ETH 405G course is an in-depth study of layer 2 and layer 3 features of Foundry Networks switches and routers including advanced technologies such as Spanning Tree, OSPF, but without BGP. It covers network design, system configuration and troubleshooting using the Foundry switches and routers.

### Course Contents

Spanning Tree  
OSPF

### Target Group

- Customers or Resellers who are experienced with Foundry Networks Products
- Network technicians with installation, configuration, and troubleshooting experience with Foundry Products
- Network Administrators responsible for implementing and managing small to large enterprise and ISP networks.
- Network support staff that will act as network device installers and first-line support for a local to global sized business environment.

### Knowledge Prerequisites

To fully benefit from this course you should have attended the ETH 103 - Basic Switch/Router Configuration and Management course). It is also recommended that you have previous exposure to switching and routing issues in a Foundry Networks environment. You should possess: a working knowledge of the following technologies:

- Spanning Tree Protocol 802.1d
- Inter-domain routing protocols (RIP, OSPF, static routes)
- Exterior-domain routing protocols (BGP)
- FNCNE level knowledge or equivalent of Layer 2 switching and Layer 3 IP routing
- Foundry Networks command line interface (CLI)

### Course Objectives

After completing this course, the student will be able to:

- Implement advanced designs and configurations in Layer 2 and 3 Data Networks
- Implement advanced STP, OSPF and BGP features on Foundry Switches / Routers
- Tune the Foundry Networks Layer 2 network for fast STP failover
- Design and configure multi-homed networks with BGP attributes and scale IBGP with route reflectors
- Interconnect Foundry Switch Routers based on a network design
- Troubleshoot the in-class design implementations using the CLI show commands

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### Reservation and Registration

We will be glad to make a free and non-binding course reservation for you for the duration of two weeks. On [www.experteach-benelux.com](http://www.experteach-benelux.com) under *Registration*, you can conveniently make course reservations, registrations, and hotel reservations. Alternatively, call us under +31 (0)76 52 32 950.

For closed groups of participants, we can modify the course contents according to your requirements. Do not hesitate to contact us!



ETH 405G

3 days

€2,160 exclusive of V.A.T.

Course date (dd.mm.yy)/Location

Course dates available on request

Up-to-date information: [www.experteach-benelux.com](http://www.experteach-benelux.com)

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## ETH 405G – Advanced Enterprise Networking

### Spanning Tree

#### Review of 802.1D Spanning Tree Protocol

- Describe the Purpose of 802.1 D Spanning Tree Protocol (STP)
- Describe STP Device Titles and the roles they play in defining an Active Path to the Root Bridge
- Describe the Device Title Election Process
- Describe the two types of Bridge Protocol Data Units
- Describe the five STP port states
- Describe an STP recovery from a Topology Change
- Predict how Spanning Tree will converge on a given network topology

#### Root Bridge Election & Path Cost

- List the Spanning Tree Defaults for Foundry Hardware
- Define Spanning Tree Bridge and Port Parameters
- Record STP parameters of a network, and predict the Root Bridge Election
- Change STP parameters so that a different Root Bridge is elected based on your design
- Change STP timers so that a spanning tree is resolved more quickly
- Record the topology change history

#### Spanning Tree Applications

- Describe the Hierarchical Model for Enterprise Switching
- List Foundry Networks Spanning Tree Features and where they are applicable

#### Rapid Spanning Tree 802.1W- Draft 3

- Shorten the STP convergence time by applying Rapid Spanning Tree
- Verify that the convergence (failover) time is shortened
- Record the (failback) time
- Describe why failover and failback times are different
- Adjust the Forward-Delay to shorten the 802.1W failback time
- Choose which ports can benefit from Draft 3 of 802.1 W
- Single Instance Spanning Tree
- Simplify Spanning Tree environments by reducing the topology to one STP instance
- Describe how CPU resources are conserved with one STP instance compared to many STP instances
- Implement conversions to Single Instance Spanning Tree and back to Per VLAN without causing network disruption

### Per VLAN Spanning Tree

- Load-balance the traffic of two VLANs across two uplinks
- Verify that traffic from either active link will failover to the other active link
- Implement Rapid Spanning Tree in the PerVLAN application and have rapid failover between the active links
- Determine which switches will provide 802.1w Draft 3 failover depending on the VLAN uplink being broken

### Per VLAN Group Spanning Tree

- Describe a Topology Group as a general tool for organizing layer 2 paths
- Reduce CPU usage and maintain uplink load balancing by grouping several VLANs under two STP instances
- Verify that all VLAN member traffic from either active link will failover to the other active link
- Implement Rapid Spanning Tree in a Per VLAN Group STP application and have rapid failover between the active links
- Verify that implementing Per VLAN Group Spanning tree has not compromised Rapid STP failover time
- VRRP in a Spanning Tree Environment
- Test the advantages of two different layer 2 designs that implement VRRP in a network core
- Describe how a Backup Router becomes Master through non-reception of Hello packets
- Configure 2 VRIDs and verify both L2 and L3 failover between them
- Observe the effect of VRRP hello packet interruption and delay

### OSPF

#### OSPF Adjacency

- Describe the OSPF Packet Types
- Describe the process of OSPF Neighbor Adjacency
- View the states of the adjacency process
- Use the OSPF debug commands to troubleshoot adjacency
- Describe how Link State costs will effect the route table
- Configure Link State costs
- Configure MD5 Authentication

#### OSPF Database

- Describe the six different Link State Advertisements LSA's and their uses

- Describe the difference between internal and external LSA's
- Record the LSA's stored in a router database
- Describe the effect that Normal OSPF area boundaries have on LSA migration
- Verify this migration in the lab

#### OSPF Route Summarization

- Configure redistribution to allow Multiple Interior routing protocols to coexist in the same network
- Describe why route summarization is beneficial to an OSPF network
- Recognize when routes should be summarized
- Design and configure Intra-Area and Inter-Area Summarization
- Configure, monitor and troubleshoot redistribution problems

#### Administrative Distances

- Define an Administrative Distance
- Describe the difference between an Administrative Distance and a Metric
- Define default Administrative Distances
- Modify an Administrative Distance

#### Blocking External LSA's

List the LSA's types that flood into Normal areas

List the LSA's types that flood into Stub areas

List the LSA's types that flood into Totally Stubby areas

List the LSA's types that flood into Not So Stubby areas (NSSA)

Use the show ip ospf database commands to recognize what areas should be made into a particular type to enhance network performance

Make area type changes and verify reduction of external LSA's in OSPF databases

#### OSPF Filters

List the filter types and describe their behavior

Design and deploy filters to block route updates and traffic



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