

# Some Suggestions and Comments on Formulating a CCIE Preparation Strategy

**Presented by:**

**NetMasterClass, LLC  
Herndon, Virginia  
A Cisco Learning Partner  
[www.netmasterclass.net](http://www.netmasterclass.net)**

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## Introduction

This document is designed to help anyone who is attempting to formulate a cohesive and logical CCIE preparation strategy. The document will refer to the following tools and resources from NetMasterClass:

- 1). The NetMasterClass CCIE Preparation web-portal
- 2). The on-line NetMasterClass Technical Library
- 3). The on-line NetMasterClass DOIT Workbook
- 4). A bundle of NetMasterClass CHECKIT Assessments

Also, this document introduces the CCIE candidate to the NetMasterClass CCIE lab problem solving method known as “know your options, make no assumptions, spot the issues”.

This document is divided into two sections:

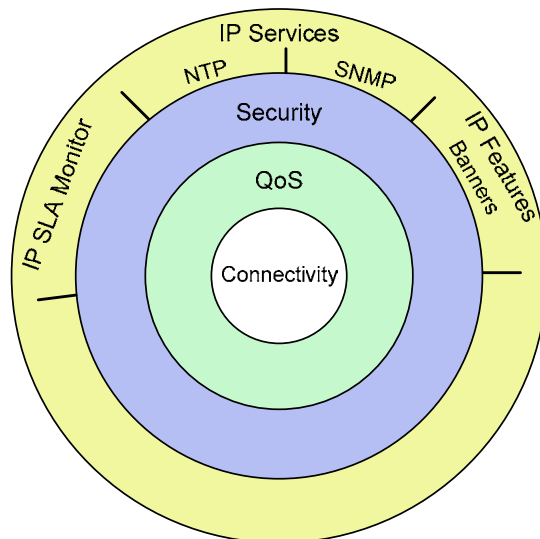
- 1). Formulating an Overall Strategy for Passing the CCIE Lab
- 2). Formulating a Strategy for Mastering the Core Foundational Topics

### PART ONE: Formulating an Overall Strategy for Passing the CCIE Lab

Ever since it was introduced, attaining CCIE certification can be an overwhelming endeavor. In order to make a CCIE certification effort more manageable, it is recommended to modularize your CCIE preparation effort. Furthermore, it is recommended to modularize your CCIE preparation effort along clear demarcation points of the different types of internetworking technology that might be encountered in the actual CCIE lab. When you consider modularizing your CCIE study efforts along the demarcating points of different technologies, consider the following CCIE “Cluster of Topics” diagrams.

Let’s take a look:

### MODULARIZE!!! The Layered Cluster of CCIE Topics



Notice that at the heart and center of this “cluster” of CCIE topics, is the topic of “Connectivity”. The connectivity core can be further modularized. See the diagram below.

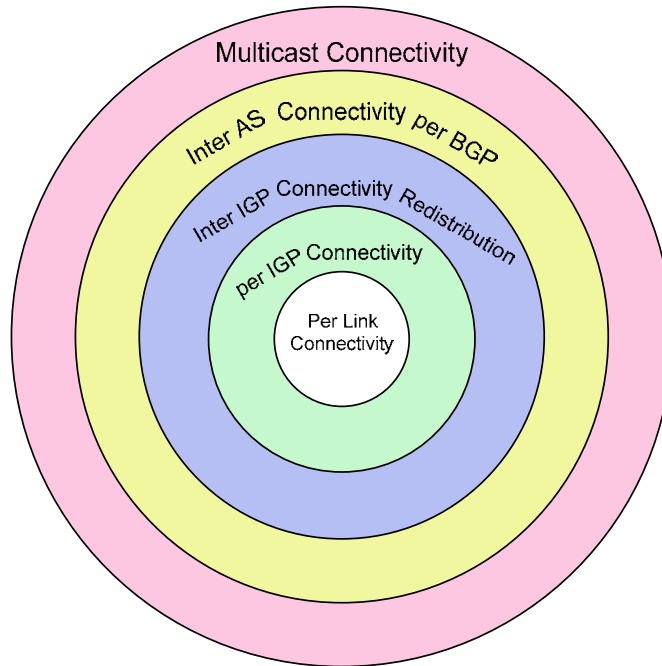
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When you examine the “connectivity cluster of topics below, please note that there is an order of dependence of the different technologies found within this cluster. The technologies on the outer rings of the diagrams rely on the technologies on the inner rings.

### MODULARIZE!!!! The Connectivity Cluster



When you count the number of layers in each of the cluster diagrams displayed above, you come up with eight key CCIE level topics. These eight topics are:

- 1). Per-link Connectivity
- 2). Per IGP Connectivity
- 3). Inter-IGP Connectivity via Redistribution
- 4). Inter-AS Connectivity via BGP

END Unicast Connectivity

- 5). Multicast Connectivity

END Connectivity in General

- 6). Quality of Service
- 7). Security
- 8). IP Services and IOS Features

A ninth topic that can be added above is IPv6. The IPv6 structure can run parallel to the entire modular, layered structure above. It would entirely replace IPv4 for each of the categories above.

**NOTE:** The eight topics listed above, along with IPv6, parallel the seven categories of topics listed in the official CCIE Routing and Switching Lab Exam Blueprint. Click here to review the official Blueprint:

[http://www.cisco.com/web/learning/le3/ccie/rs/lab\\_exam\\_blueprint.html](http://www.cisco.com/web/learning/le3/ccie/rs/lab_exam_blueprint.html)

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The eight topics displayed in the previous “cluster” diagrams, plus IPv6, can be grouped a number of ways to form a modular CCIE preparation plan. Since 1997, NetMasterClass has used a general three phase CCIE preparation process. These phases are:

**Phase One:** Master the IPv4 Unicast Connectivity Topics. NetMasterClass calls these topics “the core foundational topics”.

**Phase Two:** Attain Critical Mass in Your CCIE Preparation Effort – Master Four Expansive and Complex Topics: IP Multicast, QoS, Security and IPv6

**Phase Three:** Master the Remaining “Smaller” Topics – Master IP Services and IOS Features

When attempting to weight the relative importance of the different phases listed above, the following can be asserted: Phase Two and Phase Three are dependent on Phase One. Phase One is often called the “core foundational” phase. Therefore, it is not recommended to move onto Phases Two and Three until a high level of mastery is attained in Phase One. A high level of mastery can be measured by performing a progression of NetMasterClass CHECKiT labs.

To better understand what is included in Phase One – “the core foundational topics”, let’s review the following categories of topics:

1. Attaining Universal Connectivity on a Per-Link Basis
  - Point-to-Point Interfaces
  - Multi-access Interfaces (Switched Ethernet/Catalyst 3550/3560)
  - Point-to-Multipoint Interfaces (Frame-Relay)
  - IP Address Assignment Methods
2. Attaining Universal Connectivity on an IGP Basis
  - OSPF
  - EIGRP
  - RIPv2
3. Attaining Universal Connectivity on an inter-IGP Basis via Redistribution
4. Attaining Universal Connectivity on an inter-AS Basis via BGP

**NOTE:** To attempt to completely cover all IOS configuration tools and techniques that relate to the foundational subject of IPv4 unicast connectivity, it is suggested that the following IP Services and IOS Features be studied as well:

Network Address Translation (NAT)

DHCP

The First-Hop Routing Protocols (HSRP, VRRP, GLBP, IRDP)

ODR

Integrated Routing and Bridging (IRB)

Policy Routing

However, do not study these smaller “unicast connectivity” related topics until the four major categories of “unicast connectivity” topics are studied and mastered first. These four topics are so important and foundational to success in CCIE certification, they are listed one more time below:

1. Attaining Universal Connectivity on a Per-Link Basis
2. Attaining Universal Connectivity on an IGP Basis
3. Attaining Universal Connectivity on an inter-IGP Basis via Redistribution
4. Attaining Universal Connectivity on an inter-AS Basis via BGP

These four topics, and the sub-topics included within each of them, comprise 40-50% of the total points allocated in the entire actual CCIE lab. These topics, and the sub-topics included within each of them, will comprise 80-100% of the topics encountered in the morning of the actual CCIE lab. All other topics will build upon the configurations created for these four topics.

Therefore, in order to have a realistic chance at passing the actual CCIE lab, a candidate must be strong in the four categories of topics listed above.

When it is noted that the passing score in the CCIE lab is “80”, one must consider the following: If a CCIE candidate loses 10-12 points in configuring these core foundational topics, this means that the candidate can lose no more than another 8-10 points in the remaining topics. Given the type and number of topics that can be encountered in the CCIE lab that build upon the above listed “core foundational topics”, there is a high probability that an additional 8-10 points will be lost.

In conclusion, a CCIE candidate that is *not* very strong in the core foundational topics possesses a low probability of passing the actual CCIE lab. While it is possible that such a candidate can pass, the statistics compiled by NetMasterClass reflect that the probability is low. At the very most, CCIE candidates that have a balance of strength throughout all CCIE topics – for example, a CCIE candidate that has a moderate strength in both the core foundational topics as well as the topics the build upon this foundation – the best such a candidate can hope for is to come “close” to passing the actual CCIE lab. Such candidates must heavily rely on a lot of luck to pass the actual CCIE lab. A CCIE candidate must not only possess “moderate” strength in a range of topics. A CCIE candidate must show a “high level” of strength in a range of topics.

Two things must be said of the statements above:

- 1). You do not want to rely primarily on luck to pass the actual CCIE lab.
- 2). While “coming close to passing the CCIE lab” is an admirable accomplishment, it is not the CCIE candidate’s end goal. Obviously, the CCIE candidate wants to pass the actual exam. Also, it must be noted that unlike many university courses, there is no “curve” in the grading of CCIE lab scores. If the CCIE team needs to fail the entire group of CCIE candidates that take the lab on a given day, they will do so if all candidates receive failing grades.

In conclusion, the CCIE program extends no sympathy to candidates that come close to passing the CCIE lab. While this is an admirable achievement, it in no way translates into attaining the actual CCIE number.

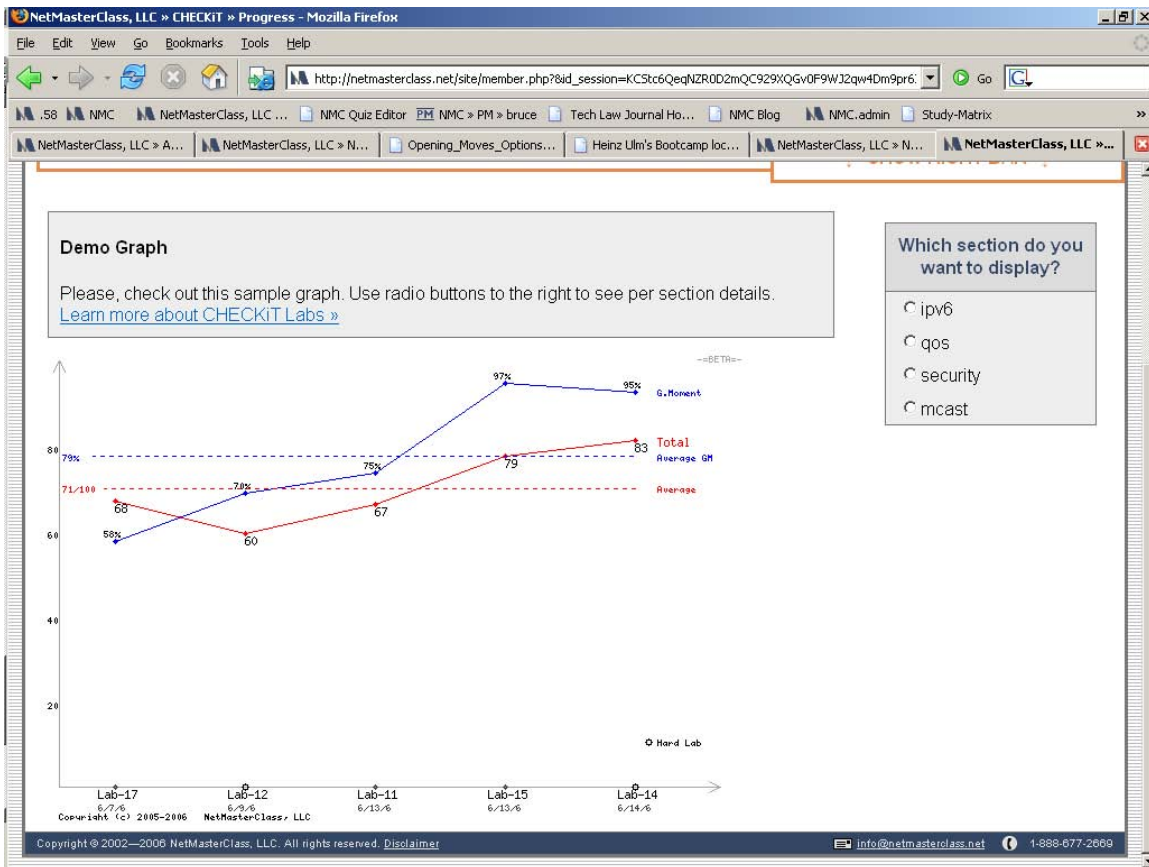
### **A Commonly Asked Question by CCIE Candidates: “How Close Am I to Passing the CCIE Lab?”**

NetMasterClass helps CCIE candidates answer this question by having them perform a series of CHECKiT labs. After a series of CHECKiT labs have been performed, NetMasterClass can apply its “ongoing trended assessment” methods to help the CCIE candidate determine how close they are to passing the actual CCIE lab.

This brief section will be dedicated to explaining what “ongoing trended assessment” is. If you know this already, you can skip this section. If you don’t, it is suggested you read this two paragraph section.

Ongoing trended assessment is applied by having a CCIE candidate perform a series of CHECKiT assessment labs. CHECKiT assessment labs are practice CCIE-level labs that attempt to simulate the actual CCIE Lab experience. After performing a series of CHECKiT labs, a trend of performance is established. From this trend of performance, a determination of the candidate’s level of readiness to take the actual CCIE lab is attained. When analyzing a candidate’s trend of CHECKiT results, the level of importance in configuring the “core foundational” topics is so crucial that two primary lines appear in the summary graph representing the overall trend of performance of any CCIE candidate that has taken

multiple CHECKiT labs. This graph is found in the personal web-portal of every CHECKiT user. These two lines are represented in the graph below.



In the graph above, a CCIE candidate has taken a total of five CHECKiT labs. The lighter line (it is a red line when viewed from the web-portal or a PDF file) reflects the trend of the total CHECKiT scores recorded for all five labs. The darker line (it is a blue line when viewed from the web-portal or a PDF file) reflects the subtotal score for all of the core foundational topics included within the score of each CHECKiT lab.

If the darker line (the blue-line) is low, obviously it will also cause the lighter line (the red-line) to be low. A CCIE candidate that is trending with a low “blue-line” after performing a series of CHECKiT labs must focus his or her primary study efforts on improving performance in configuring the “core foundational topics”.

**PART ONE: Conclusion**

To conclude this section, the following must be stated:

For anyone beginning their CCIE preparation effort, they must first focus on topics related to attaining IPv4 Unicast Connectivity – the “core foundational topics”.

It is not recommend that a CCIE candidate study any topics outside of this category until a high level of mastery is attained with the “core foundational topics”.

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It will be determined whether a high level of mastery is attained with the “core foundational topics” after a CCIE candidate has performed a series of NetMasterClass CHECKiT labs. Once a series of CHECKiT labs are performed, a trend of performance will be established (similar to the line-graph displayed in the previous section). This trend of performance will be compared against a special group of CHECKiT users – the group of CHECKiT users that have taken the same labs and have gone on to pass the actual CCIE lab.

After the NetMasterClass staff analyzes your trend and compares your trend to the group of CHECKiT users that have gone on to pass the actual CCIE lab, NetMasterClass will then make a recommendation on whether you should move into Phase Two of CCIE Preparation – attaining critical mass in your CCIE preparation effort by mastering four key topics – IP multicasting, QoS, Security and IPv6.

### **PART TWO: Formulating a Strategy for Mastering the Core Foundational Topics**

When discussing how to formulate a strategy for mastering the Core Foundational Topics, NetMasterClass has compiled an on-line Technical Library. Some of the initial sections of the Technical Library are:

- 1). Link-Layer
- 2). IGP's
- 3). Redistribution
- 4). BGP

These four sections directly map to the following sub-categories found within the overall goal of mastering the “core foundational topics”:

1. Attaining Universal Connectivity on a Per-Link Basis
2. Attaining Universal Connectivity on an IGP Basis
3. Attaining Universal Connectivity on an inter-IGP Basis via Redistribution
4. Attaining Universal Connectivity on an inter-AS Basis via BGP

As mentioned in the previous section of this document, these four sub-sections can be further sub-divided into the following sub-categories:

#### **1. Attaining Universal Connectivity on a Per-Link Basis**

1. Point-to-Point Interfaces
2. Multi-access Interfaces (Switched Ethernet/Catalyst 3550/3560)
3. Point-to-Multipoint Interfaces (Frame-Relay)
4. IP Address Assignment Methods

#### **2. Attaining Universal Connectivity on an IGP Basis**

1. Configuring OSPF
2. Configuring EIGRP
3. Configuring RIPv2

#### **3. Attaining Universal Connectivity on an inter-IGP Basis via Redistribution**

1. Methods of Performing Redistribution – One-Way, Two-Way Redistribution
2. Tools for Controlling Redistribution – Distribute-lists, Route-Maps and the Distance Command

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#### **4. Attaining Universal Connectivity on an inter-AS Basis via BGP**

1. Forming BGP Neighbor Relationships
2. Manipulating the Mandatory BGP Attributes
3. Filtering BGP Updates by Prefix, AS Path, Communities or a Combination of these Methods
4. Aggregating BGP Updates
5. Manipulating BGP Path Selection
6. Miscellaneous BGP Configuration Issues

As you can see, while we began with only four categories related to the “core foundational topics”, we now see that there are many more sub-categories within each of these categories. And it must be noted that the list provided above is only a partial list of the sub-categories found within the “core foundational topics”. A more complete list of all of the sub-categories found within the “core foundational topics” can be found in the NMC on-line Technical Library.

When CCIE candidates see the number of sub-categories increasing within this mere sub-set of the CCIE preparation effort, many oftentimes begin to feel overwhelmed again. How can we avoid this feeling of being overwhelmed? Once again, the suggested answer lies in one word: **MODULARIZE!!!**

This time we are going to modularize on a per-topic/per-technology basis.

**Modularizing on a Per Topic/Per-Technology Basis: Separate Out the Necessary and Invariant Configuration Tasks from the Non-Essential Configuration Tasks:**

#### **FORMULATING AN “OPENING MOVES” CONFIGURATION ALGORITHM ON A PER-TOPIC/PER-TECHNOLOGY BASIS**

Now, our modularization effort has been sub-divided down to a per-topic/per-technology basis.

Furthermore, we are also performing additional modularization on a per-topic/per-technology basis – this micro-modularization attempts to separate out the necessary and invariant configuration tasks from the non-essential configuration tasks. As examples, ask yourself the following questions: What are the necessary and invariant configuration tasks associated with:

- 1). Configuring Frame-Relay
- 2). Configuring a Catalyst 3550 or 3560 switch
- 3). Configuring and Creating a Point-to-Point Interface
- 4). Assigning an IP Address to an Interface
- 5). Configuring RIPv2
- 6). Configuring EIGRP
- 7). Configuring OSPF
- 8). Performing Redistribution
- 9). Forming BGP Neighbor Relationships

Attempting to answer these questions will generate many spirited discussions.

First, many may argue and debate about what configuration tasks are categorized as “necessary and invariant” and what tasks are not.

Second, many may argue and debate about what configuration options exist at each step of each task performed.

These discussions and debates are not a waste of time. These discussions and debates are not unconstructive. They are very constructive and valuable. In many respects, these discussions and debates constitute one of the most important steps in CCIE preparation. It is during these discussions and debates that a CCIE candidate will internalize his or her “opening moves strategies” for configuring the major topics that will be encountered in the CCIE lab.

Furthermore, these discussions and debates will also help the CCIE candidate to internalize the NetMasterClass CCIE analysis method known as the “consider all configuration options, make no assumptions, spot the issues” technique. The short name for this analysis method is the “issue spotting and analysis” method.

This method is graphically represented in several places in the Technical Library what are called “decision diagrams” or “options analysis diagrams”. To view some of these diagrams search on the following phrases in the Technical Library:

- An Interface Classification Decision Diagram
- A Frame-Relay Decision Diagram
- A Catalyst 3550/3560 Port Assignment Decision Diagram
- A Catalyst 3550/3560 IP Address Assignment Decision Diagram
- A Catalyst 3550/3560 Trunk Configuration Decision Diagram
- A Catalyst 3550/3560 Port Aggregation Decision Diagram
- A Catalyst 3550/3560 Spanning Tree Implementation Decision Diagram
- An IP Address Assignment Decision Diagram
- An OSPF Router LSA to OSPF Network Type Mapping Table
- An IGP Configuration Classification Table
- An OSPF Authentication Decision Diagram
- A Redistribution Decision Diagram
- A BGP Neighbor Relationship Decision Diagram

You can access up to 40 Decision Diagrams on-line in the NetMasterClass Technical Library by accessing the “My Decision Diagrams” sub-tab within the “My Lib” tab.

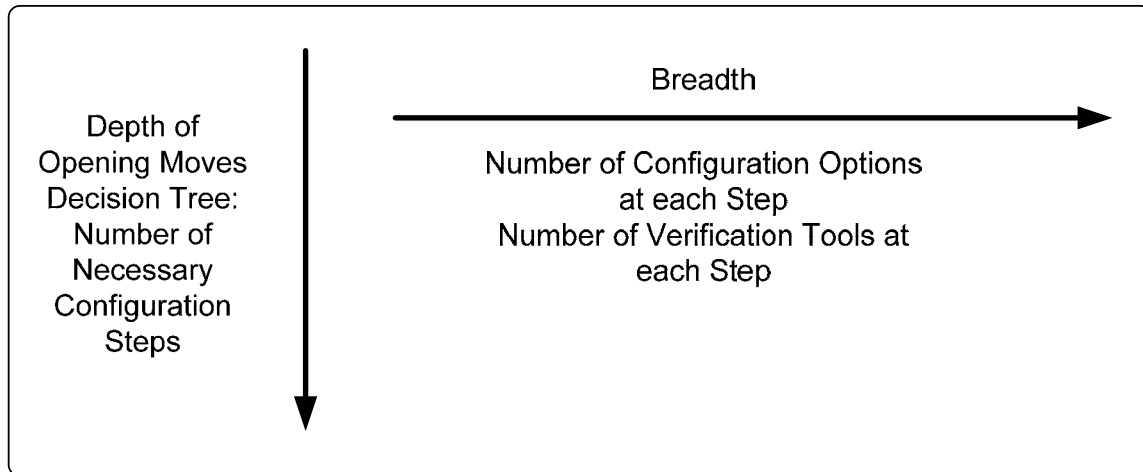
Also, three recently created IGP Opening Moves Decision Diagrams have also been posted to the NMC PDF repository in the Technical Library. You can access this PDF file by clicking on the following link:

[http://netmasterclass.net/site/articles/Opening\\_Moves\\_Options\\_Analysis\\_Diagram\\_for\\_IGP.pdf](http://netmasterclass.net/site/articles/Opening_Moves_Options_Analysis_Diagram_for_IGP.pdf)

These decision diagrams are useful for OSPF, EIGRP and RIPv2.

If you briefly review each of the pages containing the Decision Diagrams listed above, along with the above mentioned PDF file, you will see approximately 16 Decision Diagrams for topics found within the “core foundational” topics category. By reviewing these 16 Decision Diagrams, you should be getting a feel for what is involved with building an “opening moves configuration strategy” for a specific topic. Any opening moves configuration strategy decision diagram that a CCIE candidate creates should cover all of the necessary and invariant steps for configuring a specific technology AND all of the options available at each step. This general structure can be represented with the following diagram:

## Using Decision Tree Nodes to Formulate an Opening Moves Configuration Strategy



In the diagram above, notice that not only configuration steps and options are represented in an “opening moves configuration strategy” decision diagram, verification tools should be listed as well.

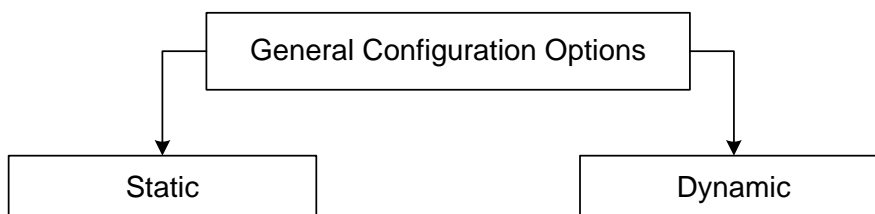
By reviewing the NetMasterClass “opening moves configuration strategy” decision diagrams and then creating some of your own, you will begin to formulate and internalize per-topic “configuration algorithms” that will guide you through any CCIE scenario, whether they are CCIE level practice labs like those found in the NetMasterClass DOiT labs or the actual CCIE lab.

While some of these “opening moves configuration strategy” decision diagrams may not allow you to complete an entire section related to a given topic, they will allow you to rapidly penetrate any section related to a given topic. This will dramatically improve the time and energy spent on configuring the necessary and invariant tasks related to a given topic. You will then have the maximum amount of time and energy to configure the remaining tasks. Ideally, your “overall configuration strategy” for a specific topic will cover all tasks related to configuring a given technology. However, make as your initial goal this: **FOR A GIVEN TECHNOLOGY, MASTER THE NECESSARY AND INVARIANT CONFIGURATION STEPS FIRST!**

### Common General Structures Found in Many “Opening Moves Configuration Strategy” Decision Diagrams

After you review many of these “opening moves configuration strategy” decision diagrams and you begin to create some of your own, you will begin to notice some common general structures. Here are some of the more commonly used general structures used in many decision diagrams:

First, there is the “static” versus “dynamic” configuration option:

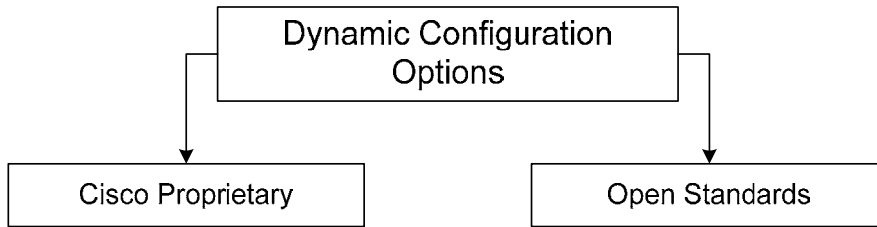


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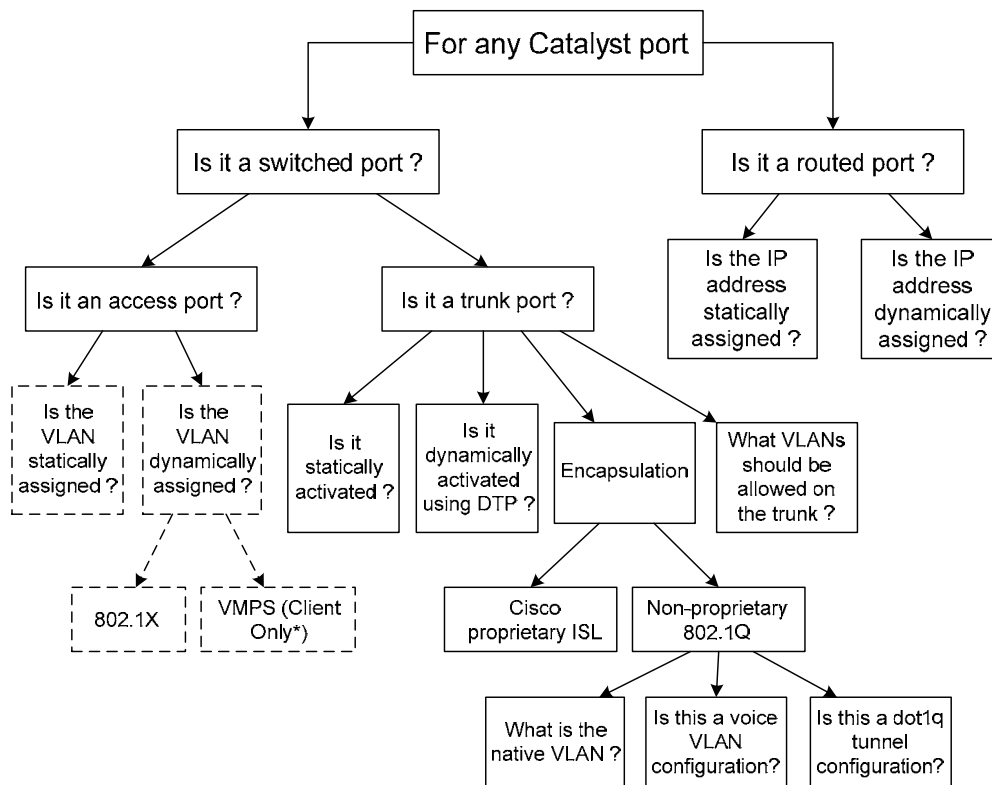
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Second, two sub-options are often found when a “dynamic” configuration option exists:

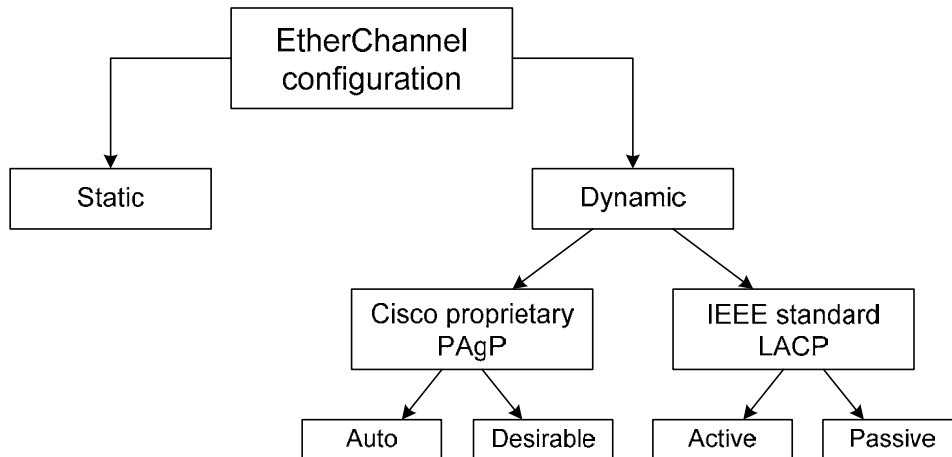


The two structures above: (1) the static versus dynamic configuration option followed by the (2) the two dynamic configuration options of (2.1) a Cisco proprietary configuration option and (2.2) an open standards configuration option can be seen in many “opening moves configuration strategy” decision diagrams. Here are two examples.

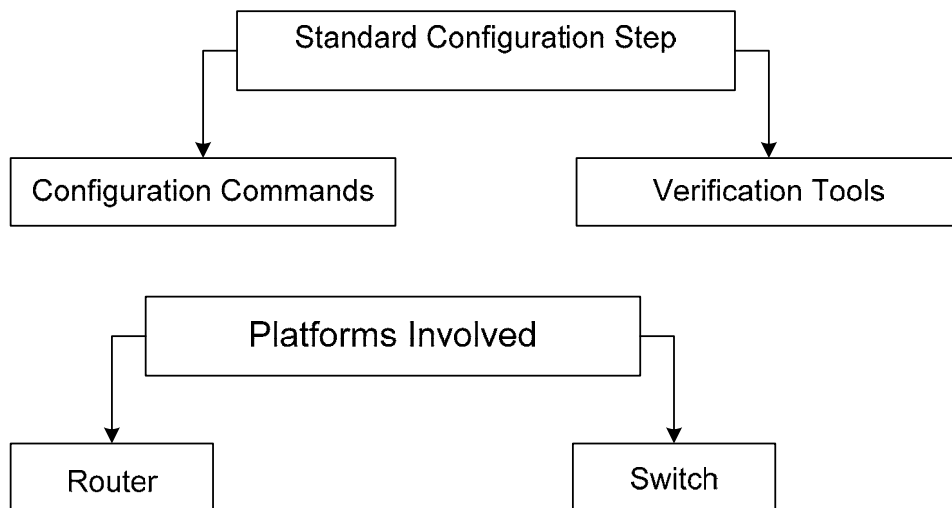
The first example is from the Catalyst port assignment options analysis diagram. Please make note of the options represented with the dotted lines:

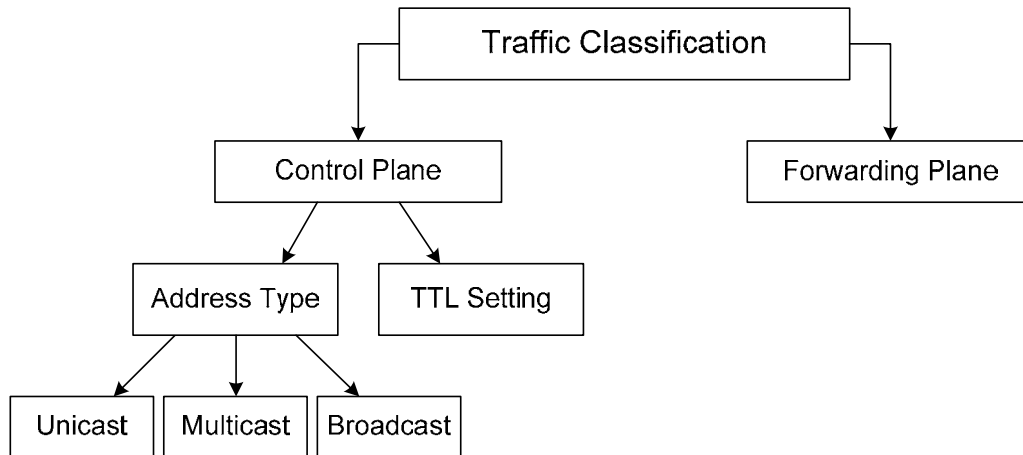


The second example is from the Catalyst Port Aggregation Options Analysis Diagram:



Other commonly found general decision tree sub-nodes found in many of the “opening moves configuration strategy” decision diagrams are:





The overall effect of a CCIE candidate formulating his or her own “opening moves configuration strategy” decision diagrams should be that the candidate can visualize each step in the configuration process of a given technology as well as the available options at each step. As crazy as this may sound, this should allow the CCIE candidate to almost become one with configuring a given technology on a Cisco router or switch.

Therefore, when a candidate has reached this level of internalization of his or her “opening moves configuration strategy” decision diagrams, he or she should be able to rapidly penetrate any configuration task related to the technology that the decision diagram was created for. The CCIE candidate will reach a point where he or she can match his or her “opening moves configuration strategy” decision diagrams with any and all CCIE level scenarios. When such a candidate encounters any vague or confusing language in a CCIE level task, regardless of the number of the following words and phrases that may be encountered – “do not use method x”, “without using method y” and/or “only using technology z” – the CCIE candidate will see this language as merely eliminating possible configuration options and by doing so, direct the candidate to the correct solution or set of solutions.

By formulating and applying one’s “opening moves configuration strategy” decision diagrams, a CCIE candidate can apply the following highly recommended two step CCIE problem solving method:

**STEP ONE:** For any given configuration task, consider ALL possible configuration options first.

**STEP TWO:** After carefully reading and re-reading the specific configuration task provided in the particular lab that is being performed, determine which options have been eliminated and determine what solution or solutions remain.

This two step problem solving approach can be summarized in the following phrase:

**“Know your options, make no assumptions, spot the issues”**

**Conclusion: Frequent Hands-on Self-Assessments Are Essential**

As we conclude this paper, it is worth noting that one of the most important steps that a CCIE candidate must perform frequently are self-assessments on the effectiveness and the degree of completeness of their “opening moves options analysis/decision diagrams”. It is highly recommended to perform these self-assessments while also performing hands-on CCIE level practice labs. By doing this, two objectives will be achieved:

- (1) A Validation of the effectiveness and completeness of one's "opening moves options analysis/decision diagrams"
- (2) As much hands-on practice time with the IOS.

It can never be stated enough, the vast majority of CCIE preparation time should be spent performing hands-on preparation activities. Anyone's "opening moves options analysis/ decision diagrams" are of minimal value if they have not been applied and tested many, many times with actual hands-on configuration scenarios (like those found in the NetMasterClass DOiT workbook). There is absolutely no substitute for logging as much hands-on time working with the IOS as possible.

This concludes this paper. Please let us know if the contents in this paper has helped you more clearly formulate a "modular" CCIE preparation strategy.

Also, please let us know whether the NetMasterClass problem solving approach of "know your options, make no assumptions and spot the issues" makes sense to you.

Thank you!