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Exam 640-505

# Remote Access

**Cisco**  
**Certified**  
**Network**  
**Professional**

Craig Dennis  
Eric Quinn



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**Craig Dennis**  
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After reading another company's book, I wasn't sure if I would pass, so I bought an *Exam Cram*. Your book filled in all the gaps that the other book had left out. I passed the test on the first try!

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I recently received my CNE, and it would not have been possible without *Exam Cram*. I found your guides INDISPENSABLE. Thank you, *Exam Cram*.

—Mayesh Nayak

I would like to commend you on the great job you guys did in putting together the materials for the *Core Four Pack*. I have passed all four tests on the first try, and I owe it all to your books. Keep up the good work!

—Kimberly Hall

I just passed my MOUS Access Expert exam. Your books were instrumental in my passing. The layout was easy to follow and the pictures gave confirmation that I was still on track. I am moving on to the Excel exam next. Guess which books are at the top of my shopping list?

—Derek Smith

See for yourself why we're #1 and drop us a line at [cipq@coriolis.com](mailto:cipq@coriolis.com)—  
we look forward to hearing about your testing successes!



# *Remote Access*

# The Cram Sheet

This Cram Sheet contains the distilled, key facts about Remote Access Exam Cram. Review this information last thing before you enter the test room, paying special attention to those areas where you feel you need the most review. You can transfer any of these facts onto a blank sheet of paper before beginning the exam.

Many of the Cisco exams have recently gone to a fill in the blank format for some of the questions. This requires typing in the answer with the correct spelling and syntax. It is important to NOT rely on the "short cuts" that are common when entering commands. Some helpful reminders are listed here.

## NEEDS

1. The Federal Communications Commission (FCC) regulates the speed to 53Kbps; hence your 56Kbps modem could run at 33.6Kbps toward the network and 53Kbps back to the modem user.
2. The technique of "bit stuffing" results in a data throughput of 56Kbps, every eighth bit is unreliable. To overcome this, a new technique was developed called "bi-polar 8 zero substitution". As the CSU (channel service unit) sees an 8-bit string of all zeros it is replaced by a substitute byte of 00011011, with two bipolar violations.

## CENTRAL SITE

3. Every byte has a start bit and one or two stop bits added to the end of the byte. In today's world, the most common form of asynchronous clocking is 8-N-1 or eight bits, no parity and one stop bit. Thus for every 8 bits of information, you must transmit at least 10 bits, or 20 percent overhead.

4. The Electronic Industries Association/Telecommunications Industry Association (EIA/TIA) defines a standard for the interface between DCE and DTE devices called the EIA/TIA-232. This standard was previously referred to as the RS-232-C standard, where the RS stood for recommended standard.
5. For example, you want to set up an 8-N-1 connection to the fourth asynchronous port on a router, which has the 10.44.5.6 address assigned to its E0 port. To connect in character mode using Telnet you would issue the following command: **Telnet 10.44.5.6 2004** where 10.44.5.6 is the router's E0 port and 2004 is the Cisco reserved port number for the fourth asynchronous port on the router.
6. It should be noted that on router models with A/S ports, the serial ports default to synchronous, and the interface must be declared for asynchronous usage using the **physical-layer async** command.
7. The correct initialization string must be sent to the modem for proper operation. This can be accomplished by using a **chat-script** or the **modem autoconfigure** command. The

common method of initialization is the **modem autoconfigure** command.

8. In addition to authentication, the PPP LCP allows for Callback, Compression, and Multilink.
9. PAP's major problem is passwords that cross the line in clear text.
10. Callback is designed by Cisco to aid in bill consolidation. Instead of having numerous telecommuting employees pay long distance fees that they have to expense, the router will call them back after the person has authenticated. While Cisco does not officially market callback as a security feature, many organizations use it as such.
11. PPP has four types of compression available to it: Stacker, Predictor, MPPC, and TCP Header compression.
12. Multilink allows for bundling of data circuits into a larger virtual pipe. For example, ISDN has two data channels that each support up to 64Kbps. You can use each channel separately or you can bind them together to form a virtual 128Kbps pipe. Multilink accomplishes this by load balancing across the circuits. Multilink ensures that packets do not arrive out of order by fragmenting the packets and then shooting the fragments across the multilinked bundle.

#### **ENHANCING ON DEMAND CONNECTIVITY**

13. The use of ISDN and DSL now provide the home user a digital "last mile". These technologies are replacing the existing modems for those who require a higher speed remote connection. The target markets here are the telecommuters and the SO/HO users.
14. A BRI circuit is composed of two channels of 64K each called B channels and one 64k D channel that is divided between 16k used for call set-up and 48K used for signaling.
15. Super Frame (SF) is used for some older T1 carrier configurations. Extended Super Frame (ESF) is used for T1 PRI configurations. Cyclic Redundancy Check 4 (CRC-4) is used for E1 PRI configurations. The line coding is AMI for T1, B8ZS for T1 PRI and HDB3 for E1 PRI configurations.
16. DSL uses frequencies greater than 4400 Hz up to 1 MHz to signal over existing copper pair that supplies voice communication.
17. A dialer profile separates configuration components from each other. Some items, like physical interface characteristics, reside in one type of configuration while others, like a phone number, reside in another configuration. This allows for mixing and matching of configuration components depending on the need.
18. A dialer pool is a group of physical interfaces. You need to configure each physical interface you want to be a member of the pool with a pool ID and priority information. An interface may belong to multiple pools.
19. A map class is a very useful part of a dialer profile. While they are an optional component, they can be used to specify different layer 1 characteristics for a call.
20. When you have multiple lines and only one phone number for incoming calls, you need to use a roll over or hunt group. This is the same concept that lots of companies use for customer service. Call one number and the next available person will pick up the phone. Use the same concept here except for data calls.
21. The 700 series router was originally a product offering from a company that Cisco purchased in the last three years. The purchase gave Cisco two ISDN products targeted for the Telecommuter and SOHO market.
22. Full PPP support is offered with the 700 series, which includes PAP and CHAP, Multilink PPP. Data compression can be added by purchasing an upgraded software feature set. The 700 can also function as a DHCP server or relay agent, and will perform PAT (Port Address Translation).
23. The 700 can store a maximum of 20 profiles. There can be 16 user profiles, or 16 definitions for remote connections. There are three permanent profiles called LAN, standard and internal, and the system profile to make a total of 20. The system profile is also referred to as the global profile in some Cisco documentation.

## THE CENTRAL SITE

24. In order to move Layer 3 traffic across an X.25 network, the router must be told of the association. You need to provide **x25 map** statements in order for the router to understand that to reach the IP network to which it wants to send packets, it must send those packets across an X.25 link.
25. X.25 supports up to eight circuits carrying data from a single protocol, as well as up to nine protocols sending data across a single circuit.
26. The default X.25 packet size is 128 bytes.
27. The **modulo** command tells the router that the maximum window size is one less than the number specified. A modulo of 8 indicates that the maximum window size is 7, whereas a modulo of 128 means the maximum is 127. The default is a modulo of 8 while the default window size is 2.
28. The Committed Information Rate (CIR) is the bandwidth that is guaranteed to get through. This differs in Frame Relay from the Burst Rate which is the maximum amount of data the pipe is capable of sending. You may send a T1 worth of data but only the CIR amount is guaranteed to get through.
29. The DLCI is a circuit ID for the link from the CO switch to your office. This is a value that is local to the CO switch.
30. The Local Management Interface (LMI) is a Frame Relay signaling standard between your router and the CO switch. LMI is responsible for making sure both devices know the other is there. In addition to acting as keepalives, LMI also acts as a form of Cisco Discovery Protocol (CDP). LMI can provide the router with its DLCI number and IP information regarding the device on the other side of the cloud.
31. BECNs and FECNs are messages from Frame Relay switches to you saying "don't send so much data!" When a Frame Relay device becomes congested and BECNs and FECNs are generated, this situation creates problems for you. If the router doesn't throttle back the number of packets it's sending out per second, packets over the CIR value will be dropped.
32. A floating static route allows for the existence of a static route on the router, but doesn't allow it to interfere with the normal routing process until needed. It's created just like a regular static route with the addition of Administrative Distance information at the end. An example would be: **ip route 10.1.2.0 255.255.0 192.168.1.4 130**. The route exists in the routing table but won't be used if a routing protocol with an AD better than 130 can find a route to the destination network.
33. You can configure dial backup to activate an interface when the amount of traffic on the primary link reaches or exceeds a certain amount. Unlike many Cisco interface references, the **backup load** command doesn't use a portion of 255 in the command. The value referenced is a straight percentage of the link's capability.
34. You can configure dial backup on an interface so that another interface activates if the primary interface goes down. This is often done with an ISDN line being the backup for a T1. If the T1 drops then the ISDN line comes up. Use the **backup interface** command on the primary interface to point to the backup interface.
35. Weighted fair queuing raises the priority level of packets that are smaller above the priority level of large packets. This tends to benefit traffic generated by applications where the user will notice a lag. An example would be Telnet traffic. Telnet sends small TCP packets containing a single character.
36. Priority queuing places traffic in groups according to the configured priority of the traffic in question. It is possible to place IPX traffic in a higher priority grouping than IP and vice versa. Priority Queuing focuses on routing the most important traffic at the possible expense of traffic that is not as important. Priority Queuing queues can hold 20, 40, 60, and 80 packets by default for each of High, Medium, Normal, and Low queues.
37. Custom queuing allows the administrator to prioritize traffic so that important traffic is serviced more frequently at the same time that this queuing strategy does not ignore certain

protocols because it is too busy handling others. Where priority queuing will handle all traffic in an upper queue before moving to a lower queue, custom queuing will handle a certain amount of bandwidth in a given queue then move on to the next queue. Custom queuing allocates traffic up to 16 queues via a queue list, 10 queues if using an IOS version prior to 11.0.

- 38. Use the **compress** command to configure Point-to-Point software compression for an LAPB, PPP, or HDLC link.
- 39. Header compression is primarily used in situations where the payload of the packet is much smaller than the header. TCP/IP header compression only works on the TCP/IP protocol and the primary usage is on packets with small payloads, such as Telnet, while crossing slow WAN links.

## ACCESS NETWORKS

- 40. Advantages of NAT include conservation of IP addresses, elimination of renumbering requirements due to overlap or changing ISPs, and increased security. Disadvantages include processor overhead to accomplish the translation, determining what device generated what packet, and some functionality issues with certain applications.
- 41. To convert the configuration for simple NAT translation to overload the administrator has to be able to type the command argument "overload". Overloading an inside global address uses the same syntax but with the extra argument the router knows to track the port numbers for the translation table.
- 42. You may clear a single entry or the entire NAT table by using the **clear ip nat** command.
- 43. Authorization allows the administrator to control authorization on a one-time basis, per-service, per-user list, per-group or per-protocol. AAA lets the administrator create attributes that describe what the user is allowed to do. The attributes are compared to the database for a given user and the capabilities are returned to the AAA server.
- 44. Accounting allows the administrator to collect information such as start and stop times for user access, executed commands, traffic statistics, and the like for storage in the RDBMS. Accounting allows the tracking of service and resources that are "consumed" by the user. The thrust is that this information can be used for client billing, internal billing, network management, or audit trails.
- 45. What method will be used if a users tries to access privileged mode on the router? If no AAA methods are set, then the user must have the enable password as the IOS would demand. If AAA is being used and *no* default is set, then the user will also need the enable password for access to the privileged mode.
- 46. Once a user has been authenticated, they can be further restricted to what they are allowed to do. This is done using the **aaa authorization** command. These restrictions can be applied to activities or services offered on the router.



*This book is dedicated to Sandra, Jacob, Joseph and David—the “group”.  
I love you guys. Thank you for being quiet on those nights when daddy  
had to get some stuff done. The other person that this book is dedicated to  
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*—Craig Dennis*



*I'd like to dedicate my portion of this book to my wife, Carolann, and  
daughter, Lee, who have supported my certification efforts through the  
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I'd also like to thank my mother for buying the Commodore 64  
that got me started on this track so very long ago.*

*—Eric Quinn*



# About The Authors

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**Craig Dennis** CNE, CBE, CCNA, CCDA, CCDP, CCSI for ICRC, ACRC, CLSC, CMTD, BCRAN, CRLS, DCN CID, spent several years with Texaco working on their Research and Development facilities. He was the Network Manager for the Marine Corps National Capitol Region Network. Craig is currently an instructor for Global Knowledge, Inc.

**Eric Quinn** CCNP, CCDP, CCSI, CNE, MCSE, MCT, has worked as a Network Administrator for several high-tech firms, has been a consultant for manufacturing and design firms, and has designed ERP and e-commerce network infrastructure for companies nationwide. Eric is currently an instructor for a Cisco Training Partner, teaching ICND, BSCN, BCMSN, BCRAN and SNAM as well as custom security courses.

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The author is the guy who spews out a bunch of words that make sense only to him. The publisher takes that diatribe and tries to make sense out of it. Friends never criticize and encourage the author even when the words are not coming. The family makes sacrifices so the author can spew out words. Now that I have finished this work, I can say that I can take credit for very little of the effort that the final product needed.

—*Craig Dennis*

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—*Eric Quinn*

# Introduction

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Welcome to the *CCNP Remote Access Exam Cram*! This book aims to help you get ready to take—and pass—the Cisco career certification test 640-505, “Remote Access.” This Introduction explains Cisco’s certification programs in general and talks about how the *Exam Cram* series can help you prepare for Cisco’s career certification exams.

*Exam Cram* books help you understand and appreciate the subjects and materials you need to pass Cisco career certification exams. *Exam Crams* are aimed strictly at test preparation and review. They do not teach you everything you need to know about a topic (like the reasons for dial-backup or electing interesting packet types). Instead, we present and dissect the questions and problems we’ve found that you’re likely to encounter on a test. We’ve worked from Cisco’s own training materials, preparation guides, and tests, and from a battery of third-party test preparation tools. Our aim is to bring together as much information as possible about Cisco certification exams.

Nevertheless, to completely prepare yourself for any Cisco test, we recommend that you begin your studies with some instructor-led classroom training. You should also pick up and read one of the many study guides available from Cisco or third-party vendors, including The Coriolis Group’s *Exam Prep* series. We also strongly recommend that you install, configure, and fool around with the Internetwork Operating System (IOS) software or environment that you’ll be tested on, because nothing beats hands-on experience and familiarity when it comes to understanding the questions you’re likely to encounter on a certification test. Book learning is essential, but hands-on experience is the best teacher of all!

## The Cisco Career Certification Program

The Cisco Career Certification program is relatively new on the internetworking scene. The best place to keep tabs on it is the Cisco Training Web site, at [www.cisco.com/certifications/](http://www.cisco.com/certifications/). Before Cisco developed this program, Cisco Certified Internetwork Expert (CCIE) certification was the only available Cisco

certification. Although CCIE certification is still the most coveted and prestigious certification that Cisco offers (possibly the most prestigious in the internetworking industry), lower-level certifications are now available as stepping stones on the road to the CCIE. The Cisco Career Certification program includes several certifications in addition to the CCIE, each with its own acronym (see Table 1). If you're a fan of alphabet soup after your name, you'll like this program.

*Note: Within the certification program, there are specific specializations. For the purposes of this book, we will focus only on the Remote Access track. Visit [www.cisco.com/warp/public/10/wwtraining/certprog/index.html](http://www.cisco.com/warp/public/10/wwtraining/certprog/index.html) for information on the other specializations.*

- *Cisco Certified Design Associate (CCDA)*—The CCDA is a basic certification aimed at designers of high-level internetworks. The CCDA consists of a single exam (640-441) that covers information from the Designing Cisco Networks (DCN) course. You must obtain CCDA and CCNA certifications before you can move up to the CCDP certification.
- *Cisco Certified Network Associate (CCNA)*—The CCNA is the first career certification. It consists of a single exam (640-507) that covers information from the basic-level class, primarily Interconnecting Cisco Network Devices (ICND). You must obtain CCNA certification before you can get your CCNP and CCDP certification.
- *Cisco Certified Network Professional (CCNP)*—The CCNP is a more advanced certification that is not easy to obtain. To earn CCNP status, you must be a CCNA in good standing. There are two routes you can take to obtain your CCNP. For the first route, you must take four exams: Routing (640-503), Switching (640-504), Remote Access (640-505), and Support (640-506). For the second route, you must take the Foundation (640-509) and Support (640-506) exams.

Although it may seem more appealing on the surface, the second route is more difficult. The Foundation exam contains more than 130 questions and lasts almost 3 hours. In addition, it covers all the topics covered in the Routing, Switching, and Remote Access exams.

Whichever route you choose, there are four courses Cisco recommends that you take:

## Table 1 Cisco CCNA, CCNP, And CCIE Requirements\*

### CCNA

#### Only 1 Exam Required

Exam 640-507	CCNA (Cisco Certified Network Associate)
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### CCNP

#### All 5 of these are required

Exam 640-507	CCNA (Cisco Certified Network Associate)
Exam 640-503	Routing
Exam 640-504	Switching
Exam 640-505	Remote Access
Exam 640-506	Support

### CCIE

#### 1 Written Exam and 1 Lab Exam Required

Exam 350-001	CCIE Routing and Switching Qualification
Lab Exam	CCIE Routing and Switching Laboratory

\* This is not a complete listing. We have included only those tests needed for the Routing and Switching track.

- *Building Scalable Cisco Networks (BSCN)*—This course corresponds to the Routing exam.
- *Building Cisco Multilayer Switched Networks (BCMSN)*—This course corresponds to the Switching exam.
- *Building Cisco Remote Access Networks (BCRAN)*—This course corresponds to the Remote Access exam.
- *Cisco Internetworking Troubleshooting (CIT)*—This course corresponds to the Support exam.

Once you have completed the CCNP certification, you can further your career (not to mention beef up your resume) by branching out and passing one of the CCNP specialization exams. These include:

- *Security*—Requires you to pass the Managing Cisco Network Security exam (640-422)
- *LAN ATM*—Requires you to pass the Cisco Campus A TM Solutions exam (640-446)
- *Voice Access*—Requires you to pass the Cisco Voice over Frame Relay, ATM, and IP exam (640-447).

- *SNA/IP Integration*—Requires you to pass the (SNA Configuration for Multiprotocol Administrators (640-445) and the SNA Foundation (640-456) exams.
- *Network Management*—Requires you to either pass the Managing Cisco Routed Internetworks and Managing Cisco Switched Internetworks—MCRI—and Managing Cisco Switched Internetworks—MCSI)
- *Cisco Certified Design Professional (CCDP)*—The CCDP is another advanced certification. It's aimed at high-level internetwork designers who must understand the intricate facets of putting together a well-laid-out network. The first step in the certification process is to obtain the CCDA and CCNA certifications (yes, both). As with the CCNP, you must pass the Foundation exam or pass the Routing, Switching, and Remote Access exams individually. Once you meet those objectives, you must pass the Cisco Internetwork Design exam (640-025) to complete the certification.
- *Cisco Certified Internetwork Expert (CCIE)*—The CCIE is possibly the most influential certification in the internetworking industry today. It is famous (or infamous) for its difficulty and for how easily it holds its seekers at bay. The certification requires only one written exam (350-001); passing that exam qualifies you to schedule time at a Cisco campus to demonstrate your knowledge in a two-day practical laboratory setting. You must pass the lab with a score of at least 80 percent to become a CCIE. Recent statistics have put the passing rates at roughly 20 percent for first attempts and 35 through 50 percent overall. Once you achieve CCIE certification, you must recertify every two years by passing a written exam administered by Cisco.
- *Certified Cisco Systems Instructor (CCSI)*—To obtain status as a CCSI, you must be employed (either permanently or by contract) by a Cisco Training Partner in good standing, such as GeoTrain Corporation. That training partner must sponsor you through Cisco's Instructor Certification Program, and you must pass the two-day program that Cisco administers at a Cisco campus. You can build on CCSI certification on a class-by-class basis. Instructors must demonstrate competency with each class they are to teach by completing the written exam that goes with each class. Cisco also requires that instructors maintain a high customer satisfaction rating, or they will face decertification.

## Taking A Certification Exam

Alas, testing is not free. Each computer-based exam costs between \$100 and \$200, and the CCIE laboratory exam costs \$1,000. If you do not pass, you must pay the testing fee each time you retake the test. In the United States and Canada, computerized tests are administered by Sylvan Prometric. Sylvan Prometric can be reached at (800) 755-3926 or (800) 204-EXAM, any time from 7:00 A.M. to 6:00 P.M., Central Time, Monday through Friday. You can also try (612) 896-7000 or (612) 820-5707. CCIE laboratory exams are administered by Cisco Systems and can be scheduled by calling the CCIE lab exam administrator for the appropriate location.

To schedule a computer-based exam, call at least one day in advance. To cancel or reschedule an exam, you must call at least 24 hours before the scheduled test time (or you may be charged regardless). When calling Sylvan Prometric, have the following information ready for the telesales staffer who handles your call:

- Your name, organization, and mailing address.
- Your Cisco Test ID. (For most U.S. citizens, this is your Social Security number. Citizens of other nations can use their taxpayer IDs or make other arrangements with the order taker.)
- The name and number of the exam you wish to take. For this book, the exam name is Remote Access 640-505.
- A method of payment. The most convenient approach is to supply a valid credit card number with sufficient available credit. Otherwise, Sylvan Prometric must receive check, money order, or purchase order payments before you can schedule a test. (If you're not paying by credit card, ask your order taker for more details.)

When you show up to take a test, try to arrive at least 15 minutes before the scheduled time slot. You must supply two forms of identification, one of which must be a photo ID.

All exams are completely closed book. In fact, you will not be permitted to take anything with you into the testing area. However, you are furnished with a blank sheet of paper and a pen. We suggest that you immediately write down on that sheet of paper all the information you've memorized for the test. Although the amount of time you have to actually take the exam is limited, the time period does not start until you're ready, so you can spend as much time as necessary writing notes on the provided paper. If you think you will need more paper than what is provided, ask the test center administrator before entering the exam room. You must return all pages prior to exiting the testing center.



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In *Exam Cram* books, the information that we suggest you write down appears on the Cram Sheet inside the front cover of each book. You will have some time to compose yourself, to record this information, and even to take a sample orientation exam before you begin the real thing. We suggest you take the orientation test before taking your first exam, but because they're all more or less identical in layout, behavior, and controls, you probably won't need to do this more than once.

When you complete a Cisco certification exam, the software will tell you whether you've passed or failed. All tests are scored on a basis of 100 percent, and results are broken into several topic areas. Even if you fail, we suggest you ask for—and keep—the detailed report that the test administrator should print for you. You can use this report to help you prepare for another go-round, if needed. Once you see your score, you have the option of printing additional copies of the score report. It is a good idea to have it print twice.

If you need to retake an exam, you'll have to call Sylvan Prometric, schedule a new test date, and pay another testing fee. The first time you fail a test, you can retake the test the next day. However, if you fail a second time, you must wait 14 days before retaking that test. The 14-day waiting period is in effect for all tests after the second failure.

## Tracking Cisco Certification Status

As soon as you pass any Cisco exam (congratulations!), you must complete a certification agreement. You can do so online at the Certification Tracking Web site ([www.galton.com/~cisco/](http://www.galton.com/~cisco/)), or you can mail a hard copy of the agreement to Cisco's certification authority. You will not be certified until you complete a certification agreement and Cisco receives it in one of these forms.

The Certification Tracking Web site also allows you to view your certification information. Cisco will contact you via email and explain it and its use. Once you are registered into one of the career certification tracks, you will be given a login on this site, which is administered by Galton, a third-party company that has no in-depth affiliation with Cisco or its products. Galton's information comes directly from Sylvan Prometric, the exam-administration company for much of the computing industry.

Once you pass the necessary exam(s) for a particular certification and complete the certification agreement, you'll be certified. Official certification normally takes anywhere from four to six weeks, so don't expect to get your credentials overnight. When the package arrives, it will include a Welcome Kit that contains a number of elements, including: