CISCO

Interconnecting Cisco Network Devices: Accelerated (CCNAX) v2.0

Global Knowledge European Remote Labs Instructor Guide

Global Knowledge™

Interconnecting Cisco Network Devices: Accelerated (CCNAX) v2.0

1. Contents

2. Introduction

This guide has been produced to assist in understanding the specific issues relating to delivering the Cisco 'Interconnecting Cisco Network Devices: Accelerated v2.0' training course, using Global Knowledge European Remote Labs equipment.

It is intended to complement the Cisco documentation and should **only** be used in conjunction with the Cisco Course Administration (CAG) and Student Lab Guides.

3. Remote Labs Topology, Connections and Setup
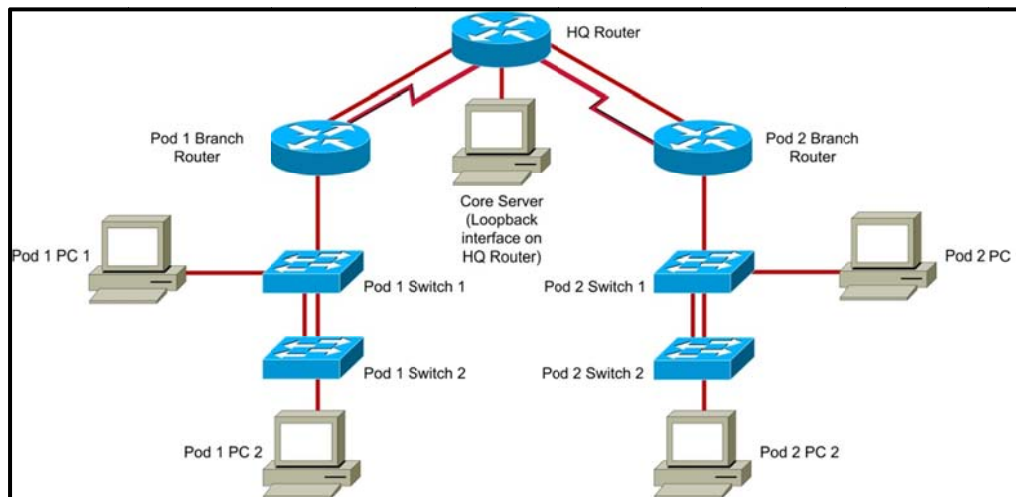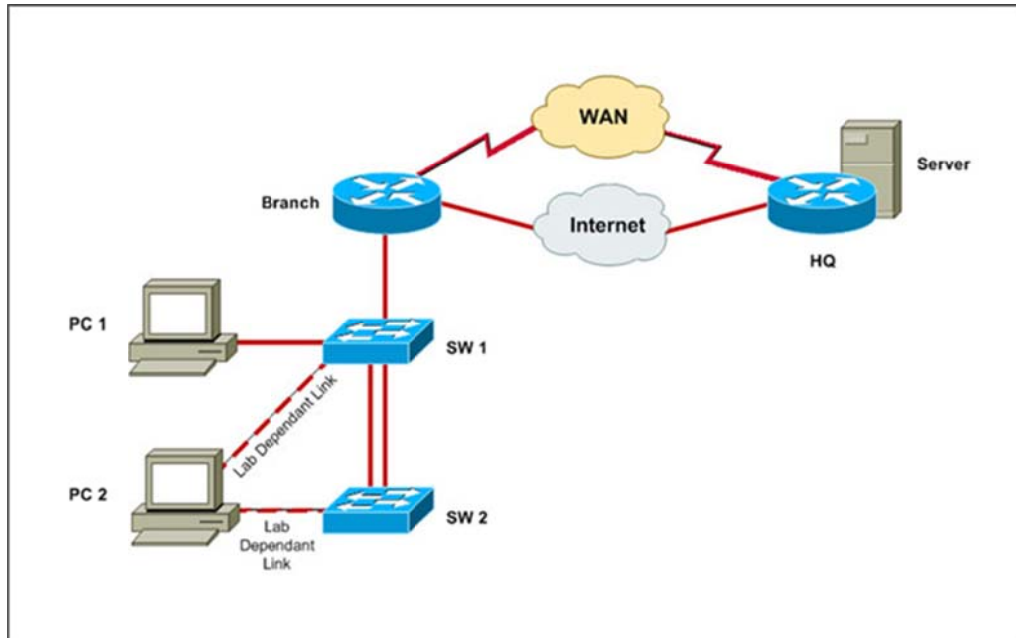
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4. Initial Lab Configuration Set-up

Device Configuration

Load the 'Base' configurations for **all** devices from the 'Device Management' tool on the Instructor Web Access page.

Core Device Logins

HQ Router:

Student level 2 enable password: <none> (privilege level 2 set on vty lines)
Instructor level 15 enable password: globalk

Student PC Logins

administrator / admin

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5. Lab Clear Down Procedure

Load the Base configurations for all devices, from the 'Device Management' tool on the Instructor Web Access page.

Notify Remote Lab Support that you have finished using the equipment by replying to the '**End of Course Confirmation**' e-mail, which will have been sent to you during the week.

Please do **NOT** reply to the 'End of Course Confirmation' e-mail for **ANY** other purpose (e.g. a support request) – this may cause confusion and your rack may be disconnected or cleared before your class has finished as a result..!!

Should you have not received the above e-mail by the time that your class has finished, please send an e-mail to the Support e-mail address (Section 2 above), confirming the Course and Rack used, that you have completed the class and finished using the equipment, along with any comments or follow-up required.

6. Lab Exercises

Job Aids: Topology and IP Addressing

Device	Interface	IP Address & Subnet Mask
Branch	Loopback 10	10.100.100.100/32
Branch	FastEthernet0/0.1 (vlan 1)	10.1.1.1/24 2001:DB8:0A01:10**P**::1/64
Branch	FastEthernet0/0.10 (vlan 10)	10.1.10.1/24 2001:DB8:0A01:A0**P**::1/64
Branch	FastEthernet0/0.20 (vlan 20)	10.1.20.1/24 2001:DB8:0A01:140**P**::1/64
Branch	FastEthernet0/1	209.165.201.1/27
Branch	Serial0/0/0	192.168.1.1/24 2001:DB8:C0A8:10**P**::1/64
HQ	FastEthernet0/1	209.165.201.2/27
HQ	Serial1/**X**	192.168.1.2/24 2001:DB8:C0A8:10**P**::2/64 (for **X** see Serial Port table below)
HQ	Loop0	172.16.1.100/24
SW1	VLAN1	10.1.1.11/24
SW2	VLAN1	10.1.1.12/24
PC1	Class LAB Interface	10.1.10.100/24
PC2	Class LAB Interface	10.1.20.100/24

Job Aids: Serial Interface Table

Pod	HQ Router Serial Interface
1	Serial 1/0
2	Serial 1/1
3	Serial 1/2
4	Serial 1/3
5	Serial 1/4
6	Serial 1/5

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Lab 1-1: Performing Switch Startup and Initial Configuration

Setup – Nothing further required. Base configurations for all devices were loaded as part of the 'Initial Lab Setup' (Section 4).

Task 1 – All OK

Task 2 – Step 4: Configure a Default Gateway on the PC of 10.1.1.1

Task 3 – All OK

Task 4 – All OK

Lab 1-2: Troubleshooting Switch Media Issues

Setup – Students to load the Pod Branch and SW1 Lab 1-2 configurations from the 'Device Management' tool on the Student Pod Web Access page.

Task 1 – Not required – trouble ticket configuration file is already loaded as in Setup above.

Task 2 – All OK

Task 3 – All OK

Lab 2-1: Performing Initial Router Setup and Configuration

Setup – No additional setup required.

Instructor to load the 'SW1' Lab 2-1 configuration(s), if student(s) have not completed Lab 1-2 successfully.

Task 1 – All OK

Task 2 – Step 3: Enable interface FastEthernet0/0

Step 4: Set the interface speed to 100 and duplex to full to match the switch SW1 Fa0/13 interface settings configured as part of Lab 1-2.

Step 5: Return to the privileged EXEC command and verify FastEthernet0/0 interface status,

Note: For all references the 'GigabitEthernet' interfaces in the Lab Guide, please substitute 'FastEthernet' instead.

Task 3 – All OK

Task 4 – All OK

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Lab 2-2: Connecting to the Internet

Setup – No additional setup required.

Instructor to load the 'Branch' Lab 2-2 configuration(s), if student(s) have not completed Lab 2-1 successfully.

Task 1 – Reminder: Replace instances of 'GigabitEthernet0/0' with 'FastEthernet0/0'

Task 2 – Step 9: If the ping from the PC to 209.165.201.1 does not work, check that the Default Gateway on PC1 has been set to 10.1.1.1

Task 3 – Step 2: You may see several user connections with the same IP addresses – these are other pods connecting to the same shared HQ Router. Your active session is marked with an asterisk(*).

Instructor Note: VRF-Lite has been implemented on the HQ router to allow for identical ipv4 addressing in each pod. The 'show users' command is not vrf-aware so will show all sessions, possibly confusingly for students, as each pod session set will have identical IP addressing. You may need to provide a simple explanation of vrf-lite, as being capable of creating several 'virtual routers' on a single hardware router chassis, thus allowing 'duplicate' IP addressing.

Task 4 – All OK

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Lab 3-1: Enhancing the Security of the Initial Configuration

Setup – No additional setup required.

Instructor to load the 'Branch' Lab 3-1 configuration(s), if student(s) have not completed Lab 2-2 successfully.

Task 1 – All OK

Task 2 – All OK

Task 3 – All OK

Task 4 – All OK

Lab 3-2: Device Hardening

Setup – No additional setup required.

Instructor to load the 'Branch' and 'SW1' Lab 3-2 configurations, if student(s) have not completed Lab 3-1 successfully.

Task 1 – All OK

Task 2 – All OK

Task 3 – All OK

Task 4 – All OK

Lab 3-3: Filtering Traffic with ACLs

Setup – No additional setup required.

Instructor to load the 'Branch' and 'SW1' Lab 3-3 configurations, if student(s) have not completed Lab 3-2 successfully.

Task 1 – All OK

Task 2 – Students to load the Lab 3-3 TSHOOT ACL Trouble Ticket config via the 'Device Management' tool on the Student Pod Web Access page.

Task 3 – All OK

Note: To avoid potential issues with students using the Cisco Configuration Professional (CCP) to login and change the shared HQ router config, the default Web page has been replaced with a 'generic' page. Login credentials are still required, as per the lab step instructions.

Lab 4-1: Configure and Verify Basic IPv6

Setup - No additional setup required.

Instructor to load the 'Branch' Lab 4-1 configuration(s), if student(s) have not completed Lab 3-3 successfully.

Job Aids: Topology and IP Addressing

Device	Interface	IP Address & Subnet Mask
Branch	Serial0/0/0	2001:DB8:C0A8:10**P**::1/64
HQ	Serial1/X	2001:DB8:C0A8:10**P**::2/64
HQ	Loopback0	2001:DB8:AC10:100::64/64

Job Aids: HQ Router Serial Interface Table

Pod	HQ Router Serial Interface
1	Serial 1/0
2	Serial 1/1
3	Serial 1/2
4	Serial 1/3
5	Serial 1/4
6	Serial 1/5

In the above tables, **P** is your Pod number and **X** is a pod-specific interface on the HQ router (Pod 1 is S1/0, Pod 2 is S1/1 etc.).

For all of the following IPv6 labs, use the IPv6 addressing scheme as detailed in the Job Aids table above.

Additionally, for all of the following IPv6 labs, substitute the Branch router Serial0/0/0 interface in place of the GigabitEthernet0/1 interface described in the Cisco Lab Guide.

Task 1 – Step 2: On the Branch router, configure an IPv6 address on the Serial0/0/0 interface. Enable the interface.

Activity Verification – Step 1: show ipv6 interface Serial 0/0/0

Steps 2, 3 & 4: ping / traceroute / telnet to the HQ router at 2001:DB8:0A01:10**P**::2

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Lab 4-2: Configure and Verify Stateless Autoconfiguration

Setup - No additional setup required.

Instructor to load the 'Branch' Lab 4-2 configurations, if student(s) have not completed Lab 4-1 successfully.

Task 1 – All OK.

Remember: For all occurrences of Gigabitethernet0/1 in the Cisco Lab Guide, substitute interface Serial0/0/0.

Lab 4-3: Configure and Verify IPv6 Routing

Setup - No additional setup required.
Instructor to load the 'Branch' and 'SW1' Lab 4-3 configurations, if student(s) have not completed Lab 4-2 successfully.

Task 1 – All OK

Lab 5-1: Configuring Expanded Switched Networks

Setup – Instructor to load the 'Core Switch' Lab 5-1 configuration, from the 'Device Management' tool on the Instructor Web Access page.

Instructor to load the 'Branch' Lab 5-1 configuration, if student(s) have not completed Lab 4-3 successfully.

Task 1 – All OK

Task 2 – All OK

Task 3 – All OK

Lab 5-2: Configuring DHCP Server

Setup - No additional setup required.

Instructor to load the 'Branch', 'SW1' and 'SW2' Lab 5-2 configurations, if student(s) have not completed Lab 5-1 successfully.

Task 1 – All OK

Task 2 – Step 1: As the PC's will typically request the IP address that they had previously (e.g .100), it is suggested that the range be amended to x.x.x.120 to x.x.x.150. This will ensure a change of IP which can then be viewed to confirm the effect.

Task 3 – All OK

Task 4 – All OK

Lab 5-3: Troubleshooting VLANs and Trunks

Setup – Students to load the Pod Branch, SW1 and SW2 Lab 5-3 configs via the 'Device Management' tool on the Student Pod Web Access page.

Task 1 – All OK

Task 2 – All OK

Lab 5-4: Optimizing STP

Setup – No additional setup required.

Instructor to load the 'Branch', 'SW1' and 'SW2' Lab 5-4 configurations, if student(s) have not completed Lab 5-3 successfully.

Note: During the lab steps, the students are advised to determine which Switch is the Root Bridge for specific vlans, then make changes to move the Root to the 'other' Switch.

To avoid confusion, it may be best to revise this and require students to set a fixed configuration of the following:

VLAN 1   Root Bridge -> SW1
VLAN 10   Root Bridge -> SW1
VLAN 20   Root Bridge -> SW2

Task 1 – All OK

Task 2 – All OK

Task 3 – All OK

Task 4 – All OK

Lab 5-5: Configuring EtherChannel

Setup – No additional setup required.

Instructor to load the 'SW1' and 'SW2' Lab 5-5 configurations, if student(s) have not completed Lab 5-4 successfully.

Task 1 – All OK

Task 2 – All OK

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Lab 6-1: Troubleshooting IP Connectivity

Setup – Instructor to load the HQ Lab 6-1 configuration via the 'Device Management' tool on the Instructor Web Access page.

Students to load the Pod Branch Lab 6-1 configuration via the 'Device Management' tool on the Student Pod Web Access page.

Instructor to load the 'SW1' and 'SW2' Lab 6-1 configurations, if student(s) have not completed Lab 5-5 successfully.

Task 1 – Additional task: Both SW1 and SW2 will require a default gateway setting in order to complete the lab as written.

      ip default-gateway 10.1.1.1

Task 2 – All OK

Task 3 – Note: The Cisco CAG guide requires that the Instructor amends the Default Gateway address all of the Pod PC1's. This is impractical on the Remote Lab setup.

However, in order to provide the troubleshooting lab, the IP address of the Branch router has been amended in the configuration to 10.1.10.10/24.

This will have the same effect as changing the PC default gateway, however students may need to add extra steps to review the Branch router config to discover the fault.

Although the PC default gateway could be amended to reflect the Branch router IP, to maintain compatibility with later labs, students should amend the Branch route IP back to 10.1.10.1/24

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Lab 7-1: Configuring and Troubleshooting a Serial Connection

Setup – Instructor to load the HQ Lab 7-1 configuration via the 'Device Management' tool on the Instructor Web Access page.

Students to load the Pod Branch Lab 7-1 configuration via the 'Device Management' tool on the Student Pod Web Access page.

Instructor to load the 'SW1' and 'SW2' Lab 7-1 configurations, if student(s) have not completed Lab 6-1 successfully.

Task 1 – Step 4: The 'debug ppp negotiation' command will produce a LOT of output. Students will have to wait a long time after issuing the 'no debug all' command for the output to cease.

It may be preferred to power-cycle the router, via the Pod or Instructor 'Power Control' tool to clear the debug output.

Step 8: It is advisable at this point to issue the shutdown command to the Branch router Serial0/0/0 interface. This will ensure a clearer output of the 'debug ppp authentication' command in Step 10:

Step 10: On the Branch router, Serail0/0/0 interface, issue the 'no shutdown'. Observe the PPP authentication debug output.

Task 2 – Step 2: The HQ router Serial interfaces are pod-specific. Students MUST configure their correct pod-specific interface.

Job Aids: Serial Interface Table

Pod	HQ Router Serial Interface
1	Serial1/0
2	Serial1/1
3	Serial1/2
4	Serial1/3
5	Serial1/4
6	Serial1/5

Task 2 – Step 5: Students are not permitted to save changes to the HQ router. They should only save changes to their Branch router.

Lab 7-2: Establishing a Frame Relay WAN

Setup – No additional setup required.

Instructor to load the 'Branch' Lab 7-2 configurations, if student(s) have not completed Lab 7-1 successfully.

Task 1 – Step 4: Students MUST configure the correct pod-specific Serial interface on the HQ router, as detailed in the previous lab notes above.

e.g. for Pod 4, the commands set would be:

frame-relay switching
!
interface Serial1/3
* encapsulation frame-relay*
* frame-relay map ip 192.168.14.1 120*
* frame-relay interface-dlci 120*
* frame-relay intf-type dce*

Task 2 – All OK

Task 3 – Step 6: On the HQ router, configure the correct pod-specific Serial interface.

Step 7: Students are not permitted to save changes to the HQ router. They should only save changes to their Branch router.

Lab 7-3: Establishing a GRE Tunnel

Setup – Instructor to load the HQ Lab 7-3 configuration via the 'Device Management' tool on the Instructor Web Access page.

Instructor to load the 'Branch' Lab 7-3 configurations, if student(s) have not completed Lab 7-2 successfully.

Task 1 – Step 1: Additionally, it is recommended to configure 'keepalive' on the Branch router Tunnel0 interface.
Otherwise the interface status will not correctly reflect the tunnel status. i.e. will show up/up, even though the corresponding HQ tunnel interface is actually shutdown and showing up/down.

Note: The HQ router Tunnel interfaces are pod-specific. However, they are configured within the pod-specific vrf, so the addressing is NOT pod-specific and should be configured as per lab steps.

Step 2: Not required, the tunnel interfaces are already enabled on the HQ router.

Task 2 – Step 9: Students are not permitted to save changes to the HQ router. They should only save changes to their Branch router.

Lab 8-1: Implementing EIGRP

Setup – No additional setup required.

Instructor to load the 'Branch' Lab 8-1 configurations, if student(s) have not completed Lab 7-3 successfully.

Task 1 – All OK

Task 2 – All OK

Task 3 – All OK.
Step 12: Students are not permitted to save changes to the HQ router. They should only save changes to their Branch router

Lab 8-2: Troubleshooting EIGRP

Setup – Instructor to load the HQ Lab 8-2 configuration via the 'Device Management' tool on the Instructor Web Access page.

Students to load the Pod Branch Lab 8-2 configuration via the 'Device Management' tool on the Student Pod Web Access page.

Task 1 – All OK

Task 2 – Step 2: This lab uses a shared HQ router, with each pod configured individually, using vrf-lite. This requires students to use a pod-specific form of commands on the HQ router to view the correct vrf routing table.

On the HQ router, enter:

*show ip protocols vrf Pod**P***   (where **P** is the pod number)

e.g. for Pod 2, the command would be 'show ip protocols vrf Pod2

Task 3 – Step 2: On the HQ router, enter:

*show ip protocols vrf Pod**P***   (where **P** is the pod number)

Lab 8-3: Implementing EIGRP for IPv6

Setup – Instructor to load the HQ Lab 8-3 configuration via the 'Device Management' tool on the Instructor Web Access page.

Instructor to load the 'Branch' Lab 8-3 configurations, if student(s) have not completed Lab 8-2 successfully.

This lab will use the pod-specific IPv6 addressing as in the Amended Job Aids table, detailed earlier in this guide.

Task 1 – All OK

Task 2 – Activity Verification:
 Step 1: The command should read:

show ipv6 eigrp interface

Step 4: Note: As this is a shared network, if all are correctly configured, students will see other pod networks in the routing tables.

Task 3 – All OK

Task 4 – All OK

Lab 9-1: Implementing OSPF

Setup – Instructor to load the 'HQ Router' Lab 9-1 configuration, from the 'Device Management' tool on the Instructor Web Access page.

Instructor to load the 'Branch' Lab 9-1 configurations, if student(s) have not completed Lab 8-3 successfully.

Task 1 – All OK

Lab 9-2: Configuring Multiarea OSPF

Setup – No additional setup required.

Instructor to load the 'Branch' Lab 9-2 configurations, if student(s) have not completed Lab 9-1 successfully.

Task 1 – All OK

Task 2 – Step 5: On the HQ router, enter:

show ip route vrf PodP ospf   (where **P** is the pod number)

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Lab 9-3: Troubleshooting Multiarea OSPF

Setup – Instructor to load the HQ Lab 9-3 configuration via the 'Device Management' tool on the Instructor Web Access page.

Students to load the Pod Branch Lab 9-3 configuration via the 'Device Management' tool on the Student Pod Web Access page.

Task 1 – Step 13: Due to the vrf setup on the HQ router, when accessing the HQ router, students MUST view and configure the correct OSPF Process.

Configure the pod-specific OSPF process with the following configuration command:

     *router ospf **P** vrf Pod**P***   **(**where **P** is the pod number)

E.g for Pod 2, the command would be: router ospf 2 vrf Pod2

Task 2 – Steps 2 & 3: Due to the vrf setup on the HQ router, when accessing the HQ router, students MUST view and configure the correct OSPF Process.

Step 2: Use the command:

     *show ip protocols vrf Pod**P***   **(**where **P** is the pod number)

E.g for Pod 3, the command would be: show ip protocols vrf Pod3

Step 3: Configure the pod-specific OSPF process with the following configuration command:

     *router ospf **P** vrf Pod**P***

Step 4: Students are not permitted to save changes to the HQ router. They should only save changes to their Branch router.

Lab 9-4: Configuring OSPF for IPv6

Setup – Instructor to load the HQ Lab 9-4 configuration via the 'Device Management' tool on the Instructor Web Access page.

Instructor to load the 'Branch' Lab 9-4 configurations, if student(s) have not completed Lab 9-3 successfully.

This lab will use the pod-specific IPv6 addressing as in the Amended Job Aids table, detailed earlier in this guide.

Task 1 – Step 1: On the Branch router, configure the OSPFv3 routing process with process ID 1.
The router must have router ID 2.1.**P**.2 (where **P** is the pod number).

Lab 10-1: SNMP and Syslog Basic Configuration

Setup - No additional setup required.

Task 1 – All OK

Task 2 – All OK

Lab 10-3: Managing Cisco Devices and Licensing

Setup – Students to load the Pod Branch Lab 10-3 configuration via the 'Device Management' tool on the Student Pod Web Access page.

Task 1 – Perform the configuration load as described in 'Setup' above.

Task 2 – Step 2: Power-cycle the Branch router via the pod web page 'Power Control' tool.

To issue the 'BREAK' console key sequence:

    If using TeraTerm: ALT+B

    If using Putty: Right-click Putty Title Bar, select 'Special Command' & 'Break'

Task 3 – The TFTP Server is already configured with a directory of C:\tftp

Task 4 – All OK

Task 5 – Step 1 – Lab router installed licenses are:

Feature: Gatekeeper
Feature: gsmamrnb-codec-pack

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7. Support Information

E-Mail

E-Mail is our preferred primary method of contact.

The Support Team E-Mail address is: **rls@globalknowledge.net**

Telephone

Support Direct Telephone Line: **+44 (0)118 989 7735**

Other Contact Methods

We do not normally encourage contact methods (e.g. Skype, Lync, MSN etc.), other than the above, as these other methods often do not easily provide a means to record and track support information. Such information is important to us, as it allows us to continually monitor and improve our support service to you.