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| **Minor Award Name** | **Network Infrastructure** |
| **Minor Award Code** | 6N0733 |
| **Level** | 6 |

**Suggested resources to support delivery:**

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| **A – Z Glossary of Networking Definitions**  **Examples:**  **Network Infrastructure**  **Topology**  **Network Convergence**  *Free* and *Trial* versions of **Network Management and Monitoring Tools.** | Website | **Techopedia** is an online dictionary for a wide range of technologies – Big Data, Cloud Computing, Mobile Computing, Security and Online Privacy. It is also much more than a dictionary. It is a repository of many resources. There are online articles, newsletters, tutorials and free resources. The definitions are succinct but there are openings out to more expanded information and related topics. It may be used as a glossary for themes and topics in the module, with additional scope for expansion of ideas and the enabling of independent study and research for learners.  Sample of Related Articles accessible from ***Web Links***:  <https://www.techopedia.com/2/27094/networks/an-introduction-to-the-osi-model>  <https://www.techopedia.com/6/27861/internet/history-of-the-internet>  <http://www.solarwinds.com/products/freetools/free-network-tools.aspx?CMP=BIZ-TAD-TCHOPDIA-NtwkFtLP-NETMAN-CLP-Q32015> | **Techopedia**  “At Techopedia, we aim to provide insight and inspiration to IT professionals, technology decision-makers and anyone else who is proud to be called a geek. From defining complex tech jargon in our dictionary, to exploring the latest trend in our articles or providing in-depth coverage of a topic in our tutorials, our goal is to help you better understand technology - and, we hope, make better decisions as a result.” | <https://www.techopedia.com/>  <https://www.techopedia.com/definition/29199/it-infrastructure>  <https://www.techopedia.com/definition/5538/network-topology>  <https://www.techopedia.com/definition/15372/network-convergence> |
| **Other Technology Dictionaries** | Website | Definitions and Referencing | *To Include:*  **Webopedia**  **Techdictionary**  **Techterms**  **Babylon** | <http://www.webopedia.com/>  <http://www.techdictionary.com/>  <http://techterms.com/>  <http://dictionary.babylon.com/science/>  <http://www.educatorstechnology.com/2013/01/15-great-dictionary-websites.html> |
| Other *Free* and *Trial* versions of **Network Management and Monitoring Tools.** | Website | Network Monitoring and Analysis Tools | *To Include:*  **Microsoft Network Monitor**  **Nagios**  **OpenNMS**  **Advanced IP Scanner**  **Capsa Free**  **Wireshark**  **WirelessNetView**  **SolarWinds** | <http://www.gfi.com/blog/the-top-20-free-network-monitoring-and-analysis-tools-for-sys-admins/> |
| **Data Center Knowledge** | Website | **Data Center Knowledge** is a leading online source of daily news and analysis about the data center industry. It covers a wide scope. Areas of coverage include advancements in power and cooling technology, processor and server architecture, networks, storage, the colocation industry, managed services and cloud, as well as developments in the modern web-scale data center space. | **The Data Center Knowledge team** | <http://www.datacenterknowledge.com/about-us/> |
| All of the topics and themes in the Network Infrastructure module are covered in this material, with the exception of more ***specific*** practical LOs that relate to Switching and Routing Essentials. | Website/  Books/Online Interactive | Re: The Industrial Certificates and Content of CompTIA A+ and CompTIA Network+ compared with QQI networking content.  Much of the Networking Fundamentals material in the QQI Network Infrastructure module overlaps and is addressed in training materials CompTIA include on their website.  CompTIA covers training options to fit particular learning styles and schedules. This range of material addresses a broader methodology, if required to include more of a ‘blended’ learning experience for the learner. In this way, the learner may at least in part learn through delivery of content and instruction via digital and online media with some element of student control over time, place, path, or pace. As CompTIA cites: “There’s a wealth of training materials available that match your learning needs and learning style. Whether you are studying on your own, or in a classroom environment, we recommend CompTIA Authorized Quality Curriculum (CAQC) training materials that will help you get ready for your certification exam and pass the test.”  The final assessment to acquire the CompTIA A+ or N+ certification differs to the continuous learning approach of QQI in that it is an online interactive, primarily multiple-choice based assessment – with some performance-based simulated assessment – the material in the textbooks and video/audio material maintain integrity to an ability to deliver and assess LO content implementing QQI’s assessment techniques. Learning materials on CompTIA’s website are categorised as follows:  **Categories**  Instructor-led Training  Online Training  Books for Classroom  Books for Self-study  Computer-Based  \*A recommendation/suggestion would be to access a text book(s) from the A+ dropdown menu as a lead in to more complex material at the QQI level 6 standard. This A+ material may also operate as a refresher to learners reviewing the equivalent content at QQI level 5. These industrial exams have not yet been officially mapped to QQI but are being utilised by instructors in this manner to date.  (Note: Mike Meyers’ books and Wiley productions are highly regarded as the textbooks of preferred choice by instructors of networking. Meyers’ language/content can at times go more deeply into the engineering/electrical side of topics whereas Wiley on its own may in some areas ‘fall short’ of required depth. Consequently, it’s finding a balance between the resources. (Analysis taken from commentary on forum and book reviews combined with subjective/experiential analysis.) | **CompTIA**  *To Include:*  ***Mike Meyers***  ***Wiley***  ***McGraw Hill***  ***Blended Learning:***  ***Gtslearning***  ***Element K***  ***Logical Operations***  ***CertMaster***  ***MeasureUp***  ***Testout***  ***e-College*** | <https://certification.comptia.org/certifications/network#exampreparation>  <https://certification.comptia.org/certifications/a#exampreparation>  **Samples:**  **Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, Fourth Edition**   * Network architectures * Cabling and topology * Ethernet basics * Network installation * TCP/IP applications and network protocols * Routing * Network naming * Advanced networking devices * IPv6 * Remote connectivity * Wireless networking * Virtualization and cloud computing * Network operations * Managing risk * Network security * Network monitoring and troubleshooting   **LogicalCHOICE CompTIA Network+ (Exam N10-006) Student Print/Electronic Training Bundle**  In this course, you will describe the major networking technologies and systems of modern networks, and be able to configure, manage, and troubleshoot modern networks. You will:   * Identify basic network theory concepts and major network communications methods. * Describe bounded network media. * Identify unbounded network media. * Identify the major types of network implementations. * Identify TCP/IP addressing and data delivery methods. * Implement routing technologies. * Identify the major services deployed on TCP/IP networks. * Identify the infrastructure of a WAN implementation. * Identify the components used in cloud computing and virtualization. * Describe basic concepts related to network security. * Prevent security breaches. * Respond to security incidents. * Identify the components of a remote network implementation. * Identify the tools, methods, and techniques used in managing a network. * Describe troubleshooting of issues on a network. |
| **Switching and Routing Essentials**  **GNS3**  **Packet Tracer** | Third-Party Software | A recommendation for delivery of this content would be for the tutor to selectively choose material from one or more text books on Switching and Routing and combine this reading and theory with video material and practical demonstration. The coverage of the textbooks in this area moves beyond the scope and depth of content in the Network Infrastructure module quite quickly, so much so that assigning an entire textbook may overwhelm the learner. These textbooks are more geared toward Cisco certification ICND1 and ICND2 which comprises CCNA knowledge and competence and is a more fleshed out skillset for intricate switching and routing and interactions with the Cisco IOS. Selectivity is therefore critical.  A second recommendation would be to introduce and encourage the use of Cisco’s **Packet Tracer** or **GNS3** to the learner from early on to enable and facilitate building networks, identifying devices and cabling, working with topologies and implementing, addressing, managing and monitoring LANs and WANs.    **GNS3 is open source software and freely available for download.**  **\*Packet Tracer is an innovative network configuration simulation tool free for Networking Academy students or is accessible when your centre is a member of the Cisco Networking Academy.** | Graphical Network Simulators | <http://www.gns3.com/>  <https://www.netacad.com/about-networking-academy/packet-tracer/>  **Why Learn with Packet Tracer?**  “The best way to learn about networking is to do it. Hands-on equipment gets students started, but is limited to the number of devices in the lab. That’s why the Cisco Networking Academy curriculum includes Cisco Packet Tracer, an innovative network configuration simulation tool used for teaching, gaming, and assessment. Packet Tracer encourages students to explore all their “what if” questions.” – Cisco.  **GNS3: How does it Work?**  Whether you are studying for your first networking exam or building out a state-wide telecommunications network, GNS3 offers an easy way to design and build networks of any size... without the need for hardware. |
| **Switching and Routing Essentials**  *To Include:*  **Basic Configuration**  **Security**  **IP Addressing**  **Subnetting**  **VLAN**  **Inter-VLAN Routing**  **Routing Protocols**  **e.g. RIP, RIPng, OSPF, OSPFv6, EIGRP** | Books/Labs  Web/Books  /Video/PDFs  /Articles | *See Lab Topologies Covered:*  <http://www.cisco.com/E-Learning/bulk/public/cln/store/topologies/icnd1v2/ICND1v2_Lab.html> | Stephen A Thomas – Wiley.  **The Cisco learning Network**  Free and Purchasable Study Materials | **IP Switching and Routing Essentials**: **Understanding RIP, OSPF, BGP, MPLS, CR-LDP, and RSVP-TE** (Paperback and downloadable eBook) by Stephen A Thomas – Wiley.  **Cisco Learning Labs for ICND1 v2.0 35-hour 90-day labs**  <https://learningnetworkstore.cisco.com/cisco-learning-labs/for-icnd1-v2-0-35-hour-90-day-cll-icnd1-v2-0-35h90d-015541?utm_source=certifications_ccent_icnd1_v2&utm_medium=link&utm_content=CLL-ICND1-V2.0&utm_campaign=CLNStore-Products> |
| **Switching and Routing Essentials** | Book/Glossary of Definitions and Workable Examples of Applied IOS Commands. | This book is designed to provide information about the Certified Cisco Networking Associate (CCNA) Routing and Switching exam and the commands needed at this level of network administration. **It is an invaluable resource for checking applicability and accuracy of commands.** *(\*It operates as the Cisco referencing ‘bible’.)* | **Scott Empson** | **CCNA Routing and Switching Portable Command Guide – 3rd Edition** |
| **Switching and Routing Essentials** | Book/Labs | This book is divided into two parts to match the content and syllabus of Cisco’s ICND1 and ICND2. In relation to the QQI Network Infrastructure module, part 1 holds relevance and contextual currency. | **Todd Lammle**  **Sybex** | **CCNA Routing and Switching Study Guide** |
| **VLSM/CIDR** | On-Line VLSM CIDR Calculator | VLSM Subnet Calculator is intended to automate and simplify VLSM calculation process. Recommended to supplement manual calculation. | **N/A** | <http://www.vlsm-calc.net/> |
| **How to configure a wireless router** | Articles | These articles can be supplemented by video material, e.g. Professor Messer or Eli, as outlined in the Online Video section. Or equally, by relevant chapters in the Networking books cited above – e.g. Mike Meyers. | **N/A** | <http://www.howtogeek.com/>  <http://uk.pcmag.com/networking-reviews-ratings-comparisons/61188/feature/how-to-set-up-a-wireless-router> |
| **Networking Fundamentals**  **Advanced Networking**  **Switching and Routing Protocols**  **LANs and WANs**  **Security** | Online Video | **Highly Recommended Free Resource.**  Professor Messer’s language is accessible and compliments a broad range of knowledge. In relation to the Network Infrastructure module, the Networking Domain in the A+ series covers fundamental knowledge. The video content in the Network + section expands on this knowledge and includes the topics to be met and assessed in the QQI module. | **James Messer** | <http://www.professormesser.com/> |
| **Networking Fundamentals**  **Advanced Networking** | Online Video | **Purchasable Material**  High in quality. | **CBT Nuggets**  **Trainsignal/now**  **Pluralsight** | <https://www.cbtnuggets.com/>  <http://www.pluralsight.com/tag/trainsignal?pageSize=48&sort=new> |
| **Networking Fundamentals**  **Advanced Networking** | Online Video | **Open Source Free Video** on wide-ranging IT Topics. Very informative and accessible. | **Eli the Computer Guy** | <http://www.elithecomputerguy.com/category/video-2/> |
| **Switching and Routing Concepts**  **Troubleshooting** | Online Video | **Open Source Free Video**  A recommendation for delivery of this content would be for the tutor to selectively choose material from one or more sections on Switching and Routing and combine this reading and theory with Dan’s video material and practical demonstration. The coverage of the concepts in this area moves beyond the scope and depth of content in the Network Infrastructure module quite quickly, so much so that assigning the entire website content may overwhelm the learner. These videos/exercises are more geared toward Cisco certification ICND1 and ICND2 which comprises CCNA knowledge and competence and are a more fleshed out skillset for intricate switching and routing and interactions with the Cisco IOS. Selectivity is therefore critical. | **Dan Alberghetti** | <http://www.danscourses.com/CCNA-2/> |
| **Networking Fundamentals**  **Advanced Networking** | Web-Based | **Open Source Free Learning Resources**  An excellent repository for a wide range of topics and themes. | **Microsoft Virtual Learning Academy** | <http://www.microsoftvirtualacademy.com/> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| CompTIA | <https://www.comptia.org/> |
| Cisco | <http://www.cisco.com/> |
| IT Jobs in Ireland | <http://makeitinireland.com/> |
| IT Jobs in Ireland | http://technicaljobs.ie/ |
| ICT Ireland | <http://www.ictireland.ie> |
| National Council for Curriculum and Assessment (NCCA) | [www.ncca.ie](http://www.ncca.ie) |
| Quality and Qualifications Ireland (QQI) | <http://www.qqi.ie/> |
| Further Education Support Service (FESS) | [www.fess.ie](http://www.fess.ie) |

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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Search regularly for new courses and new start dates  Most courses are free. Charge often applies if assessment and certification is required.  Provide excellent CPD for individuals or resources that can support teaching and learning.  **Examples in IT:**  **TechniCity**  We live in real-time, technologically enhanced cities. Explore the sweeping changes that our cities are undergoing as a result of networks, sensors, and communication technology. We are part of the 'TechniCity'.  **ICT Competency (OpenLearning)**  In the 21st century, learners are expected to utilise information and communication technology (ICT) tools to access up-to-date resources and perform essential computing tasks. This course is tailored to equip learners with the current ICT knowledge and skills in further enhancing their competency. | <https://www.mooc-list.com/>  Providers of MOOCs  e.g.  <https://www.mooc-list.com/>  <https://www.coursera.org/>  <https://www.udemy.com/>  <http://www.extension.harvard.edu/open-learning-initiative>  <https://www.uclaextension.edu/pages/search.aspx?c=free+courses>  <http://oyc.yale.edu/>  <https://www.mooc-list.com/course/technicity-coursera?static=true>  <https://www.mooc-list.com/course/ict-competency-openlearning?static=true> |