NSQF QUALIFICATION FILE
Approved in 23rd NSQC, Dated: 22nd August, 2019

NSDA Code
2019/ITES/ITSSC/3379

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:
IT-ITeS Sector Skills Council NASSCOM (SSC NASSCOM)
Plot No. – 7, 8, 9 & 10
Sector – 126, Noida
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Name and contact details of individual dealing with the submission

Name: Ms Divya Gupta

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List of documents submitted in support of the Qualifications File

1. Functional Analysis Document
2. Occupational Analysis Document
3. Qualification Pack
4. Occupational Map
5. Model Curriculum
6. Summary Sheet
7. Industry Validations

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SUMMARY

1	**Qualification Title**	IoT – Network Specialist
2	**Qualification Code, if any**	SSC/Q8208
3	**NCO code and occupation**	NCO-2015/2523
4	**Nature and purpose of the qualification (Please specify whether qualification is short term or long term)**	- This is a Qualification Pack (QP) containing National Occupational Standards for the job role "IoT – Network Specialist" - The purpose of the qualification is to help individuals at this job perform design of network architecture for end-to-end IoT solutions and for the maintenance, management, monitoring and troubleshooting of networks. The qualification will also provide them with the appropriate communication skills to build relationships with others and continuously develop their knowledge and analytical abilities.
5	**Body/bodies which will award the qualification**	SSC NASSCOM
6	**Body which will accredit providers to offer courses leading to the qualification**	IT-ITeS SSC Presently, Accreditation is not prescribed; affiliation is one of the models.
7	**Whether accreditation/affiliation norms are already in place or not, if applicable (if yes, attach a copy)**	Yes. SMART norms for accreditation and SSC norms are available for affiliation on SMART portals
8	**Occupation(s) to which the qualification gives access**	Internet of Things
9	**Job description of the occupation**	Individuals at this job are responsible for working and collaborate with various stakeholders involved in the development of IoT solutions. They will need to have excellent critical thinking, to design network architecture considering capacity, reliability and security requirements.
10	**Licensing requirements**	NA
11	**Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)**	Though some standards for cyber security exist, currently no standards specific to Statutory and Regulatory exist for Internet of Things.
12	**Level of the qualification in the**	7

	NSQF		
13	**Anticipated volume of training/learning required to complete the qualification**	374 hours (138 hours theory, 236 hours practical)	
14	**Indicative list of training tools required to deliver this qualification**	• Whiteboard and Markers • LCD Projector and Laptop for presentations • Lab equipped with the following: - • PCs/Laptops • Internet with Wi-Fi (Min 2 Mbps Dedicated) • Chart paper and sketch pens • Latest version of statistical software packages and IDEs • Chart paper, markers, picture magazines and old newspapers	
15	**Entry requirements and/or recommendations and minimum age**	Graduate in any discipline preferably Science/Computer Science/Electronics and Engineering /Information Technology who is at least 18 years of age	
16	**Progression from the qualification (Please show Professional and academic progression)**	This entry should refer to one or more of the following: - access to other qualifications at the same NSQF level – Security Specialist, Associate Consultant, Associate Product Manager - access to related qualification(s) at the next NSQF level – Senior Network Specialist, Senior Security Specialist, Consultant	
17	**Arrangements for the Recognition of Prior learning (RPL)**	- Response to market forces for RPL. - RPL assessments will be the same as our normal assessments.	
18	**International comparability where known (research evidence to be provided)**	Not Yet Established	
19	**Date of planned review of the qualification.**	11th March 2020	
20	**Formal structure of the qualification** **Mandatory components**		
	Title of component and identification code/NOSs/Learning outcomes	**Estimated size (learning hours)**	**Level**

(i)	Bridge Modules	59	-
(ii)	SSC/N8227 (Design network architecture for end-to-end IoT solutions)	75	7
(iii)	SSC/N8228 (Design network architecture considering capacity, reliability and security	40	6
(iv)	requirements)	75	6
(v)	SSC/N8229 (Maintain, manage, monitor and troubleshoot IoT network)	25	6
(vi)	SSC/N8238 (Create technical documents and manuals)	25	6
(vii)	SSC/N9005 (Develop your knowledge, skills and competence)	25	6
(viii)	SSC/N9006 (Build and maintain relationships at the workplace)	25	6
(ix)	SSC/N9010 (Convince others to take appropriate action in different situations)	25	6
	SSC/N9012 (Manage and collaborate with stakeholders for project success)		
	Total	374	

SECTION 1
ASSESSMENT

21	**Body/Bodies which will carry out assessment:** SSC NASSCOM will carry out the assessment along with the assessment partners.
22	**How will RPL assessment be managed and who will carry it out?** • *RPL assessment will be online, objective evaluation in a highly secure and proctored environment.* • *RPL assessments will be the same as our normal assessments.* • *All procedures followed will be similar to the normal assessment methodology.* • *Issuance of the qualification will be through the centralise SDMS (NSDC).* • *Quality assurance – By equating performance amongst the multiple affiliated assessment provider (AAP) and periodic analytical review and sensitivity analysis for the reliability and validity of all aspects of assessments.*
23	**Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.** • *SSC NASSCOM carries out online assessments through very robust platforms and proctoring methodology.* • *Conduct of assessment are through trained and certified proctors under the assessment agency, partnering with SSC NASSCOM* • *AAP affiliated to SSC NASSCOM come with strong industry references and long experience and analytical ability in assessment methodologies.* • *Periodic workshops are held with the vendors to bring them to a common understanding of the job role, its NSQF level, difficulty level as well as format and sample of assessment items.* • *Internal moderations further ensure the validity and reliability of the assessments and consistency of difficulty levels of the test questions across AAPs.* • *AAPs work with hirers on similar job roles, they use SMEs from their network to get industry relevant scenarios and assessment items aligned to the expected outcomes of the job role/QP.* • *Curriculum and real time scenarios facilitate further understanding the scope of the QP with reference to process knowledge and skills.* • *In addition, we conduct workshops with AAPs w.r.t. beta testing, review of the assessment analytics, performance of the test platform, moderation of NSQF levels, deployment and invigilation patterns and*

	infrastructure requirements including malpractice avoidance. • *Inferences from benchmarking and analytics patterns are taken into consideration in the development and revision of the assessment criteria and format of assessment items.* • *Reliability and validity of assessment items is standardised among AAPs.* • *Difficulty level of test items with reference to NSQF levels are ensured, so that the outcomes with reference to performance criteria of the constituent NOSs are in line with the NSQF level descriptors. This is achieved through the detailed test matrix design.*

Please attach most relevant and recent documents giving further information about assessment and/or RPL.
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in "Formal structure of the the qualification" in the Summary.

NOTE: this grid can be replaced by any part of the qualification documentation which shows the same information – ie Learning Outcomes to be assessed, assessment criteria and the means of assessment.

24. Assessment evidences

Title of Component:

Job Role	IoT – Network Specialist
Qualification Pack	SSC/Q8208
Sector Skill Council	IT-ITeS

Guidelines for Assessment:

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass a QP, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Title of NOS/Unit/Component:

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
1. SSC/N8227 Design network architecture for end-to-end IoT solutions	PC1. Evaluate requirements of the IoT network	100	10	3	7
	PC2. Identify the devices and systems to be connected by the IoT network		10	3	7
	PC3. Identify appropriate technology, devices, and deployment model to best meet the overall needs of		10	3	7

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	the IoT network				
	PC4. Design wireless/wired network nodes while taking into consideration the varieties of IoT Clients, Edge devices, Cloud Service/IoT Broker, and other networking devices		10	3	7
	PC5. Apply appropriate wired/wireless connectivity protocols for device-cloud communications (this many include protocols such as 5G, Wi-Fi, GSM, GPRS and Satellite)		10	3	7
	PC6. Evaluate impacts of IoT network on the environment and on human health		15	5	10
	PC7. Build interoperable networks where end-to-end communication is possible across diverse components		5	1.5	3.5
	PC8. Ensure network supports bulk configuration functionalities across		5	1.5	3.5

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	multiple solution components				
	PC9. Design fallback mechanisms in case of network disruptions and outages		10	3	7
	PC10. Address network redundancy considerations		5	1.5	3.5
	PC11. Evaluate regulatory aspects of building network such as permitted frequency bands		5	1.5	3.5
	PC12. Design and develop networking dashboards used for network monitoring		5	1.5	3.5
	Total		**100**	**30**	**70**
2. SSC/N8228 Design network architecture considering capacity, reliability and security requirements	PC1. Ensure network is built in line with coverage requirements	100	10	3	7
	PC2. Ensure network is built in line with capacity requirements		10	3	7
	PC3. Ensure high availability of network		10	3	7
	PC4. Ensure scalability of the network to accommodate additional devices		10	3	7

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC5. Ensure network compatibility where low-powered devices are in use		5	1.5	3.5
	PC6. Evaluate power consumption patterns while building network		10	3	7
	PC7. Ensure that network offers reliable connectivity		10	3	7
	PC8. Ensure physical security of the network		5	1.5	3.5
	PC9. Protect the network from unauthorized access or malicious intent		5	1.5	3.5
	PC10. Ensure only authorized devices should be able to connect to the network		10	3	7
	PC11. Manage the provisioning and connectivity of devices		5	1.5	3.5
	PC12. Plan physical placement of network components		5	1.5	3.5
	PC13. Apply policies on appropriate network devices to enable communications		5	1.5	3.5

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	Total		**100**	**30**	**70**
3. SSC/N8229 **Maintain, manage, monitor and troubleshoot IoT network**	PC1. Perform on-site surveys and tests on the IoT network	100	10	3	7
	PC2. Detect sources of network interference		10	3	7
	PC3. Eliminate the impact of network interference		10	3	7
	PC4. Identify areas of dense users		10	3	7
	PC5. Continuously monitor bandwidth consumption of the IoT network		5	1.5	3.5
	PC6. Identify applications which consume high bandwidth		5	1.5	3.5
	PC7. Identify methods to minimize bandwidth consumption		5	1.5	3.5
	PC8. Collect network usage and traffic statistics		5	1.5	3.5
	PC9. Monitor system logs of the IoT network		10	3	7
	PC10. Diagnose and resolve network configuration and connectivity issues		10	3	7

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC11. Identify network blind spots		10	3	7
	PC12. Perform detailed troubleshooting and analysis of IoT networks and endpoints		10	3	7
	Total		**100**	**30**	**70**
4. SSC/N8238 **Create technical documents and manuals**	PC1.Identify the purpose and the scope of the activity for which technical documentation is to be produced	100	20	6	14
	PC2.Obtain information for the technical document from relevant sources and stakeholders		15	4.5	10.5
	PC3.Draft technical document ensuring that content is concise, complete and easy to consume		15	4.5	10.5
	PC4.Review technical document content with relevant stakeholders and document owners		10	3	7
	PC5.Ensure that technical document is formatted and designed as per specifications		10	3	7

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC6.Transfer technical document to relevant stakeholders for sign-off and publishing		10	3	7
	PC7.Continuously review and update technical document		20	6	14
	Total		**100**	**30**	**70**
5. SSC/N9005 Develop your knowledge, skills and competence	PC1. obtain advice and guidance from appropriate people to develop your knowledge, skills and competence	100	10	0	10
	PC2. identify accurately the knowledge and skills you need for your job role		10	0	10
	PC3. identify accurately your current level of knowledge, skills and competence and any learning and development needs		20	10	10
	PC4. agree with appropriate people a plan of learning and development activities to address your learning needs		10	0	10
	PC5. undertake learning and development activities in line with		20	10	10

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	your plan				
	PC6. apply your new knowledge and skills in the workplace, under supervision		10	0	10
	PC7. obtain feedback from appropriate people on your knowledge and skills and how effectively you apply them		10	0	10
	PC8. review your knowledge, skills and competence regularly and take appropriate action		10	0	10
	Total		**100**	**20**	**80**
6. SSC/N9006 Build and maintain relationships at the workplace	PC1. build rapport with appropriate people at the workplace	100	1	0.3	0.7
	PC2. develop new professional relationships		1	0.3	0.7
	PC3. build alliances to establish mutually beneficial working arrangements		1	0.3	0.7
	PC4. foster an environment where others feel respected		5	1.5	3.5
	PC5. identify and engage a diverse range of influential contacts		5	1.5	3.5

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC6. obtain guidance from appropriate people, where necessary		1	0.3	0.7
	PC7. attentively listen to ideas and give constructive feedback		10	3	7
	PC8. promptly resolve conflicts between team members		5	1.5	3.5
	PC9. work with colleagues to deliver shared goals		1	0.3	0.7
	PC10. recognize the contributions made by your colleagues		5	1.5	3.5
	Total		**100**	**30**	**70**
7. SSC/N9010 Convince others to take appropriate action in different situations	PC1. gather needs of concerned people	100	10	0	10
	PC2. adapt arguments to consider diverse needs		15	0	15
	PC3. use small wins as milestones to gain support for ideas		25	10	15
	PC4. persuade with the help of concrete examples or evidences		25	10	15
	PC5. take defined steps to reach a consensus on the		25	10	15

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	course of action				
	Total		**100**	**30**	**70**
8. SSC/N9012 Manage and collaborate with stakeholders for project success	PC1. Identify the larger business and organizational context behind the requirements of the stakeholder	100	10	3	7
	PC2. Manage fluctuating stakeholder priorities and expectations		5	1.5	3.5
	PC3. Consult stakeholders early in critical organisation-wide decisions		10	3	7
	PC4. Use formal communication methods to collaborate with stakeholders (such as meetings, conference calls, emails etc.)		5	1.5	3.5
	PC5. Keep stakeholders updated on changes in project requirements		10	3	7
	PC6. Define the frequency of communication with all the stakeholders		10	3	7
	PC7. Use suitable tools to represent numbers and pictures		10	3	7

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	to present details				
	PC8. Respond to requests in a timely and accurate manner		10	3	7
	PC9. Take feedbacks from stakeholders regularly		5	1.5	3.5
	PC10. Continuously improve work deliverables/service based on stakeholder feedback		15	5	10
	PC11. Plan deliverables based on stakeholder needs		10	3	7
	Total		**100**	**30**	**70**

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Means of assessment 1 *Proctored online assessments (LAN and Web based), carried out using a variety of question formats applicable for linear / adaptive methodologies; performance criteria being assessed via situation judgement tests, simulations, code writing, psychometrics and multiple-choice questions etc.*	
Means of assessment 2 NA	

Pass/Fail

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5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass a QP, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

SECTION 2

25. EVIDENCE OF LEVEL

Title/Name of qualification/component: IoT – Network Specialist			**Level:** 7
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Process	**Requires a command of wide-ranging specialised theoretical and practical skills, involving variable routine and nonroutine contexts.** • Identify appropriate technology, devices, and deployment model to best meet the overall needs of the IoT network • Design fallback mechanisms in case of network disruptions and outages • Evaluate power consumption patterns while building network • Evaluate coverage, capacity and availability of the network while designing it	The individual in this role needs to design networks and network dashboards while taking various considerations, regulations and interoperability requirements into account. To perform his/her role effectively, the individual requires a vast understanding of appropriate technology, devices, and deployment models to best meet the overall needs of the IoT network.	7
Professional knowledge	**Wide-ranging factual and theoretical knowledge in broad contexts within a field of work or study.** • Working knowledge of Linux/UNIX system infrastructure. • Basic working knowledge of scripting	The individual in the role must have a vast amount of knowledge across organizational policies, procedures and guidelines which relate to designing and maintaining networks. Since this is a role that requires the application of knowledge across different changing	7

Title/Name of qualification/component: IoT – Network Specialist			**Level:** 7
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	languages and configuration files. • Must be able to work independently. • Knowledge of connectivity protocols for device-cloud communications (this many include protocols such as 5G, Wi-Fi, GSM, GPRS and Satellite) • Knowledge of wired/wireless connectivity protocols for device-device or device-gateway communications (this may include protocols such as NFC, NB-IoT, Bluetooth/BLE, ZigBee, Mesh and Lora) • Knowledge of network management dashboards and applications (such as HP Open View) • Knowledge of network topologies, wired and wireless technologies, fibre optics, etc.	scenarios, deep and vast knowledge is a necessity.	
Professional skill	**Wide range of cognitive and practical skills required to generate solutions to specific problems in a field of work of study.** • Build interoperable networks • Build secure networks • Ensure network supports bulk configuration functionalities across multiple solution	The role demands a skillset that allows the individual to create network architecture considering capacity, reliability and security requirements. The individual needs to have prior experience in a related field and must have the analytical ability to put these skills in practice.	7

Title/Name of qualification/component: IoT – Network Specialist		**Level:** 7	
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
	components • Protect the network from unauthorized access or malicious intent • Perform network deployment activities		
Core skill	**Good logical and mathematical skill understanding of social political and natural environment and organising information, communication and presentation skill.** • Knowledge of regulatory aspects of building network such as permitted frequency bands • Knowledge of impacts of network on the environment and on human health • Up to date knowledge of internal and external network regulations • Organizational policies, procedures and guidelines which relate to designing and maintaining networks	The individual should possess in depth knowledge of the tools required to use network capacity, coverage and reliability, network security and network deployment. Apart from the ability to use these tools, the individual needs to have a clear picture of the appropriate integrations that need to be achieved. To do so, he/she must have a strong understanding of different business and technological trends.	7

Title/Name of qualification/component: IoT – Network Specialist			**Level:** 7
NSQF Domain	**Key requirements of the job role**	**How the job role relates to the NSQF level descriptors**	**NSQF Level**
Responsibility	**Full responsibility for output of group and development.** • Make decisions on suitable courses • Pass on relevant information to others • Contribute to the quality of team working • Apply balanced judgments to different situations • Check your work is complete and free from errors • Manage the teams that deploy and implement the IoT networks	The role demands working in a team to identify appropriate technology, devices, and deployment model to best meet the overall needs of the IoT network. This may involve helping peers with their work from time to time and providing feedback and advice to help improve the quality of their work. Since this role is likely to have people reporting to it, the individual performing this role is supposed to take responsibility for the output and the development of the entire team.	7

SECTION 3
EVIDENCE OF NEED

26	**What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?** As the number of devices connected to the internet increases, there is going to be a rapid increase of Specialists who can design network architectures and maintain and monitor them. They must be able to connect machines to each other and to the control systems that will oversee them. They must have up to date knowledge on WANs, edge networking, fog computing, next-gen 5G networking technologies, Wi-Fi, and low-power LAN protocols used in IoT devices. https://www.networkworld.com/article/3199886/top-5-skills-needed-for-the-industrial-iot.html?page=4 There is a need for professionals who will realize that the challenges created by connecting systems and machines were not designed keeping standard networks in mind. Networks required by IoT solutions must move information around efficiently with as little latency as possible. Design considerations to be made while developing IoT networks are different from those made while developing conventional networks. For e.g., IoT networks would have to be interoperable, highly scalable, take physical security into consideration, etc. All this point to the need for Network Specialists who are specialized specifically in the IoT domain. https://www.networkworld.com/article/3201042/network-engineering-is-key-to-meeting-iot-expectations.html
27	**Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences** In place. MeitY has approved all the 9 QPs w.r.t. Internet of Things. Currently, there are no regulations on IoT by the government or any other industrial body. However, NASSCOM is working with NITI Aayog to build national policies.
28	**What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification** *Cleared by QRC at NSDC. There is only no other qualification in the NQR with respect to the Internet of Things, which is – 'IoT – Network Specialist.' This is a specific role that is responsible for building and maintain IoT networks.*

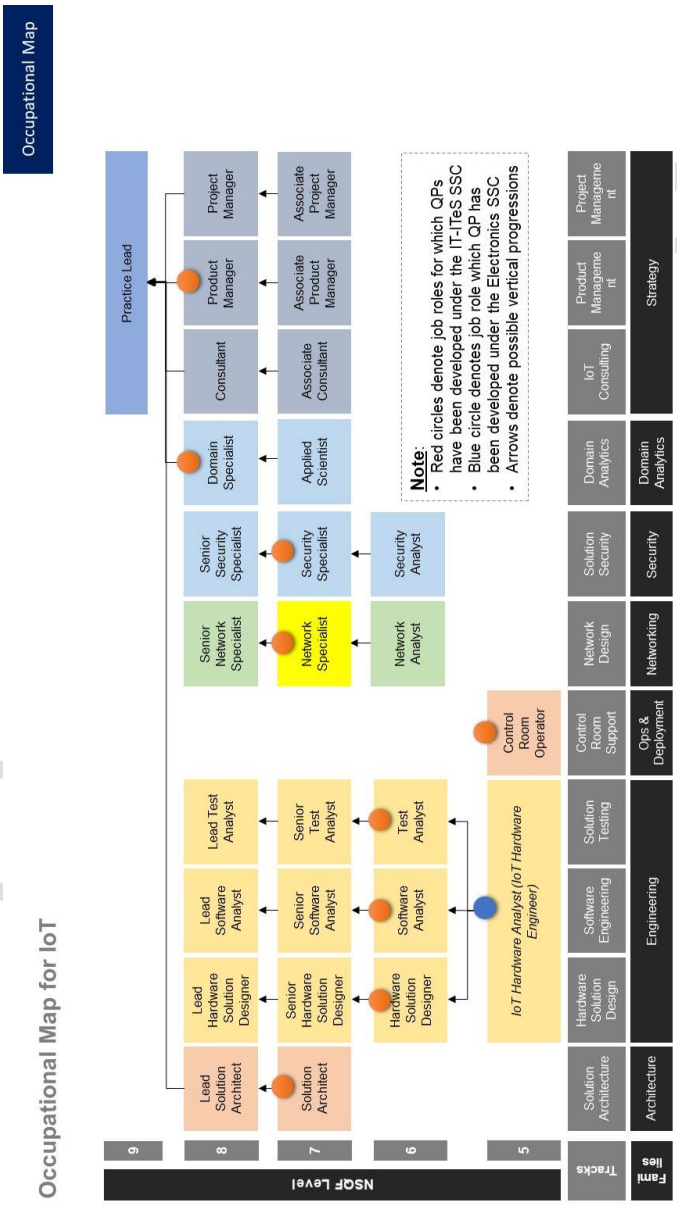
29	**What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here** • *Monitoring and review of the qualifications is a project executed every two years.* • *While adoption by industry and academia is one good indicator for the usefulness of a qualification pack, we adopt multiple approaches for periodic review and maintenance of the qualifications.* *1. Sub-sector wise Industry council, headed by council chair is a formal part of our governing structure. The council participates and steers the qualifications creation and upkeep. This council is a body elected by over 1800 member companies of NASSCOM.* *2. Special interest groups are formed for a more focused and detailed review of the qualifications in the light of emerging knowledge and skill areas.* *3. Events and workshops are conducted periodically to validate, monitor and review the qualification.* *4. As a part of due diligence process for affiliating Training providers, we do ask them for validation from their hirers – thus covering even medium, small and micro segment of the hiring companies.* *5. Any institution / individual is welcome to send feedback, which is recorded and considered during next review cycle.* *The above data is used to update the Qualification and this revision is published annually. Nonetheless, if a major feedback is received prior to the planned review period, the change is considered in consultation with the industry council.*

Please attach most relevant and recent documents giving further information about any of the topics above.
Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

- NASSCOM Talent Demand and Supply Report – Internet of Things

SECTION 4
EVIDENCE OF PROGRESSION

30	**What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?** ***Show the career map here to reflect the clear progression***



The Career /Occupational Map reflects horizontal and vertical mobility emanating from' Job Families' and 'Tracks' across NSQF and experience levels .

Presently 9 of the most popular job roles/ QPs in this Internet of Things Occupation have been articulated as per IT-ITeS industry's direction and

	aspirations.

Please attach most relevant and recent documents giving further information about any of the topics above. Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.