

METHOD AND SYSTEM FOR IMPLEMENTING AND MANAGING VENDOR NEUTRAL NETWORK SYSTEMS

Field of the Invention

[0001] The present invention relates to network planning, implementation and management. It relates particularly to a method and system for optimizing the planning, design, equipment selection, implementation and management of network equipment and management systems.

Background of the Invention

[0002] Computers in offices are often connected to one another for communication in a network system. A network system comprises of network equipments, network management systems, test tools etc. Some examples of network equipments are computers, routers, switches etc. These network equipments are normally connected to one another in groups called segments. Network management systems and test tools are connected to the network equipments at different segments of the connected network equipments.

[0003] Depending on the size and capacity of the network, the network can be a complex integration of wired or wireless connections of computers. The setting up and management of the network systems to support diversified business processes is often a long tedious process, involving multiple vendors and personnel.

[0004] Network system integrators or designer usually perform the planning and implementation of the network. Before setting up a network of computers, the network system integrator or designer will need to gather massive information on the requirements of the users and equipments.

[0005] This is followed by tedious planning and designing of the physical and logical connections of the network based on the requirements and equipments. Due to the complexity of the network, planning and designing often requires long hours and going

through massive information. This task is highly dependant on the experience of the network system integrator or designer.

[0006] The implementation of a network also entails configuration of routers, switches and other network equipments to achieve the requirements of the network for the end users. Tremendous amount of time is again required during the gathering of information, planning and configuration of these network systems.

[0007] Network system integrators also need to take extra care to ensure interoperability and performance of different network systems in the network. The level of difficulty to achieve interoperability and optimum performance of the network systems increases with a more complex network involving more network equipments and management systems. More often than not, different network systems vendors configure network systems differently based on different sets of configuration commands and steps. Thus, network system integrators will have to rely on the vendors for information on the configurations, so as to ensure interoperability and compatibility of equipments when implementing the network. Information provided by the vendors may not be accurate at all times and consolidation of information from vendors is often a time consuming task.

[0008] On top of the challenges above, other factors such as optimum performance of the network and its equipment, reliability of the network and costs are to be considered by the network system integrator when setting up the network. This further complicates the setting up the network.

Summary of the Invention

[0009] The present invention seeks to provide a method and a system that combines planning, equipment selection, implementation and management of network equipment and network management systems to achieve interoperability, reliability and optimum performance in the shortest possible time.

[0010] The present invention seeks to provide a system for implementing and managing a vendor neutral network system, the system comprising a template generator for

generating a plurality of templates, a configuration generator for automatically configuring a plurality of network equipments based on the plurality of templates, and a performance test controller for validating the vendor neutral network system by checking for any deviation between the plurality of templates and a plurality of performance test reports.

[0011] Accordingly, in one aspect, the present invention provides A method for implementing and managing a vendor neutral network system, the method comprising steps of: a) obtaining user requirements, b) generating a plurality of templates, c) connecting a plurality of network equipments to one another physically based on the plurality of templates generated, d) configuring the plurality of network equipments, e) connecting at least one network management system physically to each segment of the plurality of network equipments, f) conducting an initial remote testing, and g) conducting performance testing with a performance test controller.

Brief Description of the Drawings

[0012] A preferred embodiment of the present invention will now be more fully described, by way of examples, with reference to the drawings of which:

[0013] FIG. 1 illustrates a functional block diagram of the system in accordance with the present invention;

[0014] FIG. 2 illustrates a flow chart of the method for selection, implementation and management of vendor neutral network equipment and network management systems in accordance with the present invention;

[0015] FIG. 3 illustrates a flow chart of the step of generating templates in FIG. 2;

[0016] FIG. 4 illustrates a flow chart of the step of conducting initial remote testing in FIG. 2;

[0017] FIG. 5 illustrates a flow chart of the step of generating user requirement specification template in FIG. 3; and

[0018] FIG. 6 illustrates a flow chart of the step of selecting vendor neutral network equipments in FIG. 3.

Detailed Description of the Drawings

[0019] A preferred embodiment of the invention is described. In the following description, details are provided to describe the preferred embodiment. It shall be apparent to one skilled in the art, however, that the invention may be practiced without such details. Some of these details may not be described at length so as not to obscure the invention.

[0020] The method and system in accordance with the present invention offers a quick and convenient system that assists network consultants or designers to set up a network and configure the network equipments and network management systems in the network systems. The system also allows network consultants or designers to verify the performance of the network equipments and management systems. The method and system therefore greatly reduces the time and effort required in setting up, configuring the network systems and obtaining the network systems' performances.

[0021] Referring to FIG. 1, an illustration of a system functional block diagram of a preferred embodiment in accordance with the present invention is shown. The system comprises a template generator 110 that receives users' input on the requirements of the network. Some examples of the requirements are floor plan, budget, duration for completion of the network, number of users, existing available equipments etc. The template generator 110 then generates a plurality of templates 125 that are required for the configuration of network equipments and network management systems based on the users' input.

[0022] The plurality of templates 125 comprises user requirement specification template 120, network equipment templates 135, costing templates 155, physical network design templates 145 and logical network design templates 165. Network designers are able to physically connect a plurality of network equipments 160 that are available, based on the physical network design templates 145 and logical network design templates 165 generated. The connections can also be done in a simulated environment using a simulated engine that creates simulated network equipment models connected to one another in a simulated network.

[0023] A configuration generator 130 configures the plurality of network equipments 160 automatically with reference to the plurality of templates 125. Configuration files are generated by the configuration generator 130 and loaded onto the plurality of respective network equipments 160. The loading of configuration files may be done using protocols such as Simple Network Management Protocol (SNMP).

[0024] The connected plurality of network equipments 160 now forms part of a network system. Network management systems 170 and test tools 150, if any, are connected physically at various segments of the network system for performing an initial remote testing on the network with the control of the network management systems 170. Management system configuration files are also generated by the configuration generator 130 and loaded onto the network management systems 170. At least one test tool 150 can also be used to perform remote testing.

[0025] The initial remote testing is performed to check on the functionality, interoperability and performance of the network. After the completion of remote testing, network performance parameters such as quality of Voice over Internet Protocol (VoIP) packets, network systems' Quality of Service (QoS), network delay, jitter, response time etc. are stored as test scripts in the configuration generator 130. The network designer is then able to redesign or reconfigure the network equipments manually after the remote testing to improve on the network design.

[0026] The test scripts from the configuration generator 130 are uploaded to a performance test controller 140, which is connected to the network management systems 170 and test tools 150, to conduct further performance tests. Performance test reports 180 are generated by the performance test controller 140 and the results are analyzed and checked to determine if the user requirements have been met. This is done by comparing the performance test reports 180 with the user requirement specification template 120. Any deviation from the user requirements can then be remedied by redesigning the particular segment of the network. All documents, templates, test reports generated in the process are consolidated for future reference and maintenance of the network.

[0027] Referring to FIG. 2, an illustration of a flow chart of the method for selection, implementation and management of vendor neutral network equipment and network management systems in accordance with the present invention is shown. User requirements and objectives are first obtained 210 by collecting information using methods such as filling electronic questionnaire forms, specification documents, interviewing etc. These user requirements comprise both non-technical and technical parameters such as budget allocation, duration allocated for setting up the network, existing network equipments available, performance objectives, future needs, etc.

[0028] With the collection of user requirements, a plurality of templates 125 will then be generated 220 either manually or with a template generator 110. The plurality of templates 125 comprises user requirement specification template 120, network equipment templates 135, costing templates 155, physical network design templates 145 and logical network design templates 165.

[0029] Network equipments 160 that are available are then connected physically 230 to form a network, with reference to the physical network design templates 145 and logical network design templates 165 generated. Instead of physically connecting the network equipments to form a network, a simulated network can be formed using a simulated engine that creates and connects network equipment models in a simulated environment.

[0030] The network equipments are then configured automatically 240 by a configuration generator 130. The vendor neutral configuration is performed with reference to the plurality of templates 125 generated 220. Configuration files are generated by the configuration generator 130 and loaded onto the respective vendor neutral network equipments 160. Simple Network Management Protocol (SNMP) may be used to load the files onto the respective vendor neutral network equipments 160.

[0031] Network management systems 170 and test tools 150, if any, are then connected physically 250 at various segments of the network before performing an initial remote testing 260 of the configured network equipments 160. With the control of network management systems 170 and test tools 150, an initial remote testing 260 is conducted for functionality, interoperability and performance.

[0032] The initial remote testing is performed 260 with the control of network management systems 170 and test tools 150, if any, followed by performance testing 270. A performance test controller 140 is connected to the network management systems 170 and test tools 150, if any, to conduct performance testing 270. After performance testing is completed, the performance test controller 140 generates performance test reports 180, which are analyzed and checked to determine whether the user requirements generated by the template generator 110 have been met. Any deviation from the user requirements can then be remedied by redesigning the particular segment of the network. All documents, templates, analyzed test reports generated in the process are then consolidated 280 for future reference and maintenance of the network.

[0033] Referring to FIG. 3, an illustration of a flow chart of the step of generating templates 220 in FIG. 2 is shown. User requirement specification template 120 is first generated 300 either manually or using a template generator 110.

[0034] Table 1 below shows of an example of a user requirement specification template. The user requirement specification template in Table 1 shows user requirements categorized in the first column of the table, such as the applications supported in the network, the number of users using the network, the type of infrastructure on which the

network will be supported by and the area of coverage for the network. In the first row of the table, the user requirements are categorized under existing condition, new requirements and future requirements are tabulated.

	Existing	New Requirements	Future
Applications supported	Web services and mail services	VoIP services	Video conference
Number of users	100	150	300
Infrastructure	Wired	Wired and wireless	Wireless
Area of coverage	3 – level building	1 additional level	6 – level building

Table 1

[0035] Based on the user requirement specification template generated 300, a check is performed 305 to determine whether the existing network equipments in a present network, if present, are able to fulfill the user requirements. If the existing network equipments in the present network are able to fulfill the requirements, new physical design templates 145 and logical design templates 165 will be generated 330. If there is no existing network equipment or the present network equipments are unable to meet the requirements, selection of vendor neutral network equipments 310 follows.

[0036] The quantity of network equipments and optimum selection of possible network equipments to form the network are then decided based on the user requirement specification template. Network equipment templates 135 and costing templates 320 are also generated. The network equipment templates 135 describe the existing network equipments that will be utilized when setting up the network, as well as newly selected network equipments that are not in existence. The costing templates describe an estimate of costs involved based on the type, model, and quantity of the network equipments requirement 160. The costs include cabling costs. It is an estimate of the material costs derived from the records of price of equipments captured in a database.

[0037] Physical network design templates 145 and logical network design templates 165 will then be generated 330 based on the user requirement specification template 120, network equipment templates and costing templates. The physical network design templates 145 and logical network design templates 165 describe the design of the network, in particular the connection and arrangement of the network equipments, as well as the design of Internet Protocol (IP) address allocation. The physical network design templates 145 give details on the cabling and connector types, the cabling length required (if the information of floor or campus plan is made available), the best arrangement in providing redundancy links etc. The logical network design templates 145 describe the recommended IP address for each port of all the network equipments, the subnet mask, the recommended routing protocols required for each router, etc.

[0038] Referring to FIG. 4, a flow chart of the step of conducting initial remote testing 260 in FIG. 2 is shown. Remote testing comprises checking functionality, interoperability and performance of the network 600. This is done with the control of network management systems and test tools, if any.

[0039] Next, network performance parameters generated by the configuration generator 130 for applications such as quality of VoIP packets, network systems' QoS, network delay, jitter, response time etc. are stored as test scripts 610 in the configuration generator 130. This is followed by loading the test scripts to the performance test controller 620, which is connected to the network management systems 170 and test tools 150, to conduct further comprehensive performance tests.

[0040] Referring to FIG. 5, a flow chart of the step of generating user requirement specifications template 300 in FIG. 3 is shown. User requirements received by the template generator 110 are first categorized 410 into categories such as applications supported, budget, number of users, design objectives etc.

[0041] The template generator 110 will next check for any conflicting user requirements 420 or insufficient information. Examples of conflicting requirements can be fairness of distribution of users' equipments versus optimum equipment performance for some

users, stringent security verification process versus fast response etc. If there are conflicting requirements or insufficient information, the system then prompts user for more information 425 such as priority setting of the user requirements. For example, fairness of distribution of users' equipments may be given a higher priority over providing optimum equipment performance for some users, thereby ensuring that all users' equipments have relatively equal equipment performance.

[0042] If the conflicts and insufficiency are not resolved 440, the user may then seek for recommendations from the system 430. At least one solution with respect to the priority setting of user key requirements to resolve the conflict will be provided. If the user chooses not to seek for recommendations from the system 430, the user may then provide more information 425 or change the priority setting of user requirements to resolve the conflict or insufficient.

[0043] If the information is sufficient and there are no conflicting user requirements, the template generator 110 will proceed to generate user requirement specification template 300.

[0044] Referring to FIG. 6, a flow chart of the step of selecting vendor neutral network equipments in FIG. 3 is shown. The user requirement specification template 120 is first compared with existing network equipments 500 to identify the gaps between the network equipments required and existing network equipments.

[0045] The gaps are tabulated in another template 510, which is to be compared with a list of network equipments stored in a database 515 for matches between the gaps in the template and the list of network equipments. Possible vendor neutral network equipments are then selected 530 based on matches.

[0046] Selection of the possible vendor neutral network equipments is essentially based on some key user performance requirements such as speed, security level etc. The closest match from the database will be applied if none of the equipments in the database match the gap. User requirements may also be ranked in order of priority. For example,

if the requirement of speed has a higher priority than security level, an equipment having the capability of higher speed will be chosen instead of one that has a higher level of security.

[0047] It will be appreciated that although one preferred embodiment has been described in detail, various modifications and improvements can be made by a person skilled in the art without departing from the scope of the present invention.

Claims

1. A system for designing a new vendor neutral network system with a plurality of network equipments, the designing system comprising:
 - a template generator for receiving users' input on the requirements of the plurality of network equipments and generating a plurality of templates required for the configuration of the plurality of network equipments;
 - wherein the plurality of templates comprises:
 - a user requirement specification template specifying the user requirements;
 - a plurality network equipment templates automatically selecting a plurality of vendor neutral network equipment based on the user requirement specifications template;
 - a plurality of costing templates describing an estimate of costs involved in setting up the vendor neutral network system;
 - a plurality of physical network design templates describing the connection and arrangement of the plurality of network equipments; and
 - a plurality of logical network design templates describing information on logical setup of the network;
 - a configuration generator for automatically configuring a the plurality of network equipments based on the plurality of templates; and
 - a performance test controller for validating the vendor neutral network system by checking for any deviation between the plurality of templates and a plurality of performance test reports.
2. The designing system of claim 1, wherein the vendor neutral network system further comprises
 - at least one network management system connected to each segment of the plurality of network equipments for managing the plurality of network equipments.
3. The designing system of claim 2, wherein the vendor neutral network system further comprises

at least one test tool for testing the functionality, interoperability and performance of the vendor neutral network system.

4. The designing system of claim 2 or 3, wherein the performance test controller is connected to the at least one network management system and/or the at least one test tool.
5. The designing of claim 1, wherein the information on the logical setup of the network comprises Internet Protocol address allocation, subnet mask and recommended routing protocols.
6. The designing system of claim 1, wherein the performance test controller generates the plurality of performance test reports.
7. The designing of claim 2, wherein the configuration generator generates configuration files to be loaded onto the plurality of network equipments.
8. The designing system of claim 2, wherein the configuration generator generates configuration files to be loaded onto the plurality of network management systems.
9. The designing system of claim 1, wherein the configuration generator generates test scripts to be uploaded to the performance test controller.
10. The designing system of claim 9, wherein the test scripts are network performance parameters comprising quality of Voice over Internet Protocol packets, Quality of Service, network delay, jitter and respond time.
11. A method for designing a new vendor neutral network system with a plurality of network equipments, the method comprising steps of:
 - a) obtaining user requirements;
 - b) generating a plurality of templates required for the configuration of the plurality of network equipments; wherein the step b) further comprises steps of:

- b1) generating user requirement specification template;
 - b2) determining whether existing plurality of network equipments in a present network fulfill the user requirements in the user requirement specification template;
 - b3) selecting a plurality of vendor neutral network equipments;
 - b4) generating a plurality of network equipment templates;
 - b5) generating a plurality of costing templates; and
 - b6) generating a plurality of physical network design templates and logical design templates;
 - c) configuring the plurality of network equipments;
 - d) connecting a plurality of network equipments to one another physically based on the plurality of templates generates;
 - e) connecting at least one network management system physically to each segment of the plurality of network equipments;
 - f) conducting an initial remote testing; and
 - g) conducting performance testing with a performance test controller.
12. The method of claim 11, wherein the method further comprises connecting at least one test tool physically to each segment of the plurality of network equipments.
13. The method of claim 11, wherein the step f) further comprises steps of:
- f1) checking functionality, interoperability and performance of the vendor neutral network system, wherein the vendor neutral network system comprises a plurality of network equipments and at least one network management system connected to each segment of the plurality of network equipments for managing the plurality of network equipments;
 - f2) generating a plurality of test scripts and storing the plurality of test scripts in configuration generator;
 - f3) loading the plurality of test scripts to the performance test controller.
14. The method of claim 11, wherein the step b1) further comprises:
- b10) categorizing user requirements;

b11) determining if there is any conflicting user requirements or if the user requirements information is sufficient;

b12) prompting user for more information to resolve conflicting user requirements, wherein the conflicting user requirements comprises priority setting of the user requirements;

b13) determining if the conflicting user requirements have been resolved;

b14) generating user requirement specification template.

15. The method of claim 11, wherein the step b3) of selecting a plurality of vendor neutral network equipments further comprises:

b31) comparing user requirement specification template with existing network equipments;

b32) tabulating gaps in a template;

b33) comparing the template with a list of network equipments stored in a database for matches between the gap and the list of network equipments;

b35) selecting a plurality of vendor neutral network equipments based on the matches.

16. The method of claim 11 or 12, wherein the step f) of conducting an initial remote testing is performed with controls of the at least one network management systems and/or the at least one test tool.

17. The method of claim 11, wherein the method further comprises the step of consolidating documents, the plurality of templates and a plurality of test reports.

18. The method claim 17, wherein the method further comprises the step of comparing and a plurality of test reports with the user requirement specification template for verifying the performance of the network system.