Certified Public Manager Class
January 2, 2003

Good job.
Excellent use of flow charts.
Good progress -- massive, helpful project.
M.

Final Project
Change Control Management

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Computer Services WAN/LAN Group
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Overview of WAN/LAN Group

The Computer Services WAN/LAN group has the responsibility for maintaining the data network at the University of South Carolina. The University data network has approximately 17,000 nodes (computers, printers, servers, etc) connected to it. The data network provides connectivity to client server based applications, the Internet, super computers, and research facilities. With the increase in the use of tools such as the Internet by Faculty in an effort to better teach to students the network has become more important. The demand for the network to be available all of the time has never been higher. In order for the network to be used as an effective tool the WAN/LAN group must meet this demand.

The WAN/LAN group has 11 full time employees ranging from entry-level technician to high-level engineer. The staff has the primary responsibility of ensuring that network resources are available at all times. These employees range in years of service from 1 year to 28 years. It will be a challenge to find a method that both new employees and those that have been there through it all can adjust to.

The WAN/LAN group prides itself on the stability that the network has obtained over the past year. This stability has allowed Colleges and Departments from around the University to deploy new network-based applications with a great deal of success. With this success has come a high expectation by these units that the network will be available at all times. The WAN/LAN group has made it a goal to meet these expectations. The purpose of this project is to design some processes that will assist the WAN/LAN group in attaining these lofty goals.

Problem

The University data network consists of approximately 1000 unique pieces of hardware that must be maintained by the WAN/LAN group. Each unique piece of hardware also has a unique configuration. Until very recently the policing of modifications to the equipment and its configuration did not exist. This led to problems being induced on to the network when a change was made. These problems often rendered mission critical applications such as HR or Student Information Systems inoperable. Often this change was made for the purpose of a new device going on the network or when a new requirement for the network arose. A technician would get the request for the new service and would make the change with no approval or paper trail to document the change. This caused instability of the data network.

In the past six months all changes to the network have been required to go through a verbal authorization process. This involves a request coming in from a customer for a service, the technician that received the request creating a design and then

taking that design to the manager for approval. Once the manager gave approval of the design he or she then gave specific instructions on the process to use to implement the changes. Though the WAN/LAN group has had a great deal of success using this process it is not very efficient. The WAN/LAN group would like to automate the process and have a history of all of the changes that have taken place. This data could be used for a number of things that would help the group plan for the future expansion and growth of the University data network. It would also aid in controlling changes to the network in an effort to ensure stability.

It is the goal of this project to first document current processes for the group using flow charts. Once all of the processes have been documented then analysis will be done on how those processes can be automated using a new software called Pinnacle and how Cisco Works can be used to keep a history (archive of configurations) of changes made on the network that can be viewed by all technicians online. Each of the existing tasks will be recreated using this new process and a flow chart will be created to show the new process. Each member of the staff will be trained to the new processes and expected to follow them for all changes that are necessary on the network.

Data Collected

The following is a list of points that were identified during the discovery phase of this project. The database in Appendix C is also part of the discovery. That database is a list of all of the work requests that were received through the Iris work order system. As of this year no work will be performed without going through this system. This will give us a more accurate account for the work requests and will be in use until Pinnacle is fully implemented.

- The first thing that was discovered was that there are no current documented processes for the WAN group so I was forced to document all of the processes.
- While documenting the processes of the WAN group I quickly realized that most of the processes crossed in to other departments. I have made the decision to cut the project off and not attempt to resolve inter department issues with this project.
- When I initiated conversations about creating flow charts of processes I found that other departments had created some flow charts of the processes within their groups. This was helpful in showing the way the other departments handled work orders and how they recorded the work.
- I found that many of the current processes were not efficient use of the resources available as a whole in the Department. Much of this has been caused by a lack of integration and understanding of job skills within the separate departments. This was one of the single biggest discoveries this project has brought to light. I estimate that at least 30% of the current trouble calls could be resolved without a site visit which will save a tremendous amount of tech time that will allow us to catch up on tickets and get a quicker turn around on trouble calls. This will not be resolved by this project but as a result of the information found within this data discovery. Once the new processes are in place (January 2003) I will begin to

measure this by getting an accurate count on the number of times we saved a site visit by using the WAN/LAN group troubleshooting skills.

- Important to note that this discovery was made as a result of charting the processes in an effort to control change management on the network. The true purpose of this project is to implement a change control process with the ultimate goal of having that process fully automated. What has been discovered from charting the processes have been that all in all, our processes are not bad. Until this project was created all processes had been verbal and in the past year I had been verbally communicating the change control process. Through flow-charting I have found many inefficiencies and also identified areas of weakness and misunderstanding within the WAN group itself. One inefficiency is the lack of individuals with the ability to make a decision to allow a change to be made on the network that may cause performance problems. This is a result of the technicians not having an understanding of the overall infrastructure at the University. This is a problem that will need to be addressed but is outside the scope of this project. For this project the WAN manager will be the individual that has the authority to allow changes to occur to the network.
- One alarming statistic that has been the driving force behind this project is the result of not having a change control process in place. In the past changes were made by any member as they felt it was necessary. Many of the changes were never communicated to the other members of the group, other Computer Services departments, or the user community. This caused multiple problems including the fact that often times a problem would be created by a change but the individual that made the change would not be the one who got the problem reported to them as a result of the way problems were reported.
- As the flow charts show the change control process is now being built into all of the processes. The current processes are showing a manual procedure of all technicians having to manually work with several of the other departments within the WAN group in order to complete a task with the proper authorization. Again the ultimate goal of this project is to automate that process.
- Computer Services has purchased all of the software that I intend to use to automate this process. The software that will be used for the routing of orders is called Pinnacle and it will be used in our help desk, for documentation of cable plant and several other processes. I intend to use it as a paper less trail for the change control process. In order to meet this goal I will have to work with the project manager and a software developer to have the software tailored to meet our needs for a change control process. This software will not be ready to go in to production for at least a year so until then I will be using a data base that I have created in Microsoft Access to act as a history of the number of work requests that come in as well as the number of errors that the WAN group makes that result in a network outage. Cisco Works was also purchased and has been implemented. We are currently training technicians on how to use Cisco Works to make changes to the network. Cisco Works automatically creates a backup of the configuration prior to the change going in to effect and can easily be rolled back to that configuration with in Cisco Works. The training for the technicians on Cisco Works will be detailed later in this project. It is my intent to build the

processes of authorizing the changes in to the pinnacle software so that it will be transparent to the technicians and require little training.

- I report to the Director of Computer Services and she has given me the authority to implement the change control process.

Implementation of Fix

New Processes

Implementing new processes will be the easiest portion of this project because it is internal to the WAN group. I have already been working with all of the technicians on documenting their processes as can be seen in Appendix A "Flow Charts". I have been going through each of the different scenarios of the types of work that the technicians do on the network. It is my intention to use these flow charts to aid in creating templates with in Pinnacle that will have all of the different types of work in it and will have a different route depending on the type of work that is being completed. The templates will also include all of the detailed tasks necessary for each work order. The flow charts will be distributed to all of the technicians so they can have a document that shows them what they need to do for any particular task they need to complete. When Pinnacle is fully implemented they will have this on every work order thus eliminating the paper work.

Pinnacle

This will be the most difficult portion of the implementation because this software is replacing a number of systems that Computer Services currently uses including, IRIS (problem reporting software), COMAN (billing software), and Access Database (current cable plant documentation). There is a project manager assigned to implementing this software and approximately a team of thirty individuals assigned to the implementation. The individuals are tasked with telling the project manager all of the business case scenarios that take place within the different departments at Computer Services so that we can create our business rules to meet what the software can do. This means that Computer Services is adapting their practices to the software not the software to our business rules. That will make for a painful migration to the new system, as it will involve a culture change for many of the departments. For the purpose of this project it is vital that I attend the implementation meetings so I can understand how we will be able to control changes to the network using the software. An example of this would be that a request comes in through the system for a new network. The request is routed to a technician in the WAN group to be worked. The WAN technician completes the design portion of the task and routes the ticket to me for approval prior to completing the order and making the changes. The system would have a record of that order being routed to me and my approval based on a box being checked on the order. Once the technician receives the order back in his queue he/she will complete the order.

In preliminary meetings we are now discussing how the work requests will be handled in the system. We have the ability to create templates in the system. For example, we can take our new router flow chart and create a template that includes all of the steps of that particular task. We can create as many templates as we need. When a work request comes in it is routed to a WAN group supervisor and he or she decides what type of

request it is. From there a template is forwarded to the technician that will be completing the work so that we can ensure the proper procedure is followed and all of the tasks that go with that request are done. By having the supervisor assign the template this inherently provides additional change management.

Cisco Works

Cisco Works is a network management suite that is sold by Cisco. The University has an all Cisco network and all equipment that the WAN group installs is Cisco hardware and can be managed by Cisco Works. The WAN group has implemented this software and a select few have been developing it within the group for about eight months. One of the many tools it has is a configuration manager. This tool is used as a configuration archive and can do several things such as automatically back up the configuration of all 1000 pieces of hardware that are on the University network. It can also make configuration changes and can even be scheduled to do this automatically. For the purpose of this project this tool will be used to keep a history of the changes that are made to the network and an online archive of the past three configurations so at any time an automatic fall back can take place. This feature allows for mistakes to be easily and quickly corrected so that a limited loss of service takes place. Much of the work of implementing Cisco Works has already been completed and it is running today in a stable environment and is heavily used by three of the technicians as they were assigned the task of implementing it. The WAN group recently purchased a more powerful server to run Cisco Works on and it will be installed in the next month to ensure that the tool is responsive.

All of the technicians in the WAN group will need to be trained on how to use this tool before the change control system can be complete. The training will include how to make configuration changes, how to roll back to an archived configuration and also how to monitor the device fault manager to see if the changes had a negative impact on the network and what that impact is. The three technicians that were assigned the task of implementing Cisco Works will perform all of the training and also continue to develop the tool as to automate other network tasks and monitoring.

Change Order System

The current work order system does not allow for automated reports on types of work requests or type of work done. The new system, Pinnacle, will allow for fully automated reports based on a number of criteria. The WAN/LAN group does receive work requests on a daily basis through the current system (IRIS) and we have a record of every request however they do not all require a change to made to the system that could cause a network outage. In order to determine how many of these do require a change to be made that could cause a problem to more than one user the tickets would have to be manually audited. To get a baseline of the number of requests I will audit all of the tickets that have been received since January 1, 2002.

Measurements

There is no current measurement of the network downtime or what caused the interruption of service. There is an Outage system that the WAN/LAN group uses to

inform customers of network outages and it offers a description of the reason for the outage. The system allows for planned outages as well in order to inform the customers of maintenance time. This system is a database that feeds an email system as well as a website that shows all of the current outages. The website can be viewed by anyone at iris.csd.sc.edu.

I will use this system as a reference, in an effort to record all of the errors, as this system will have all of the network outages on it. However the outage system does not always accurately describe the reason for the outage. Often if a technician makes an error we will not disclose that information on the outage system.

To get a more accurate number of the technician errors and what caused them to make the mistake I am going to create a database that I can keep with accurate descriptions of the reason for the network outage. With this database every error will fall in to a category that I can track and over time see if we have made any progress towards correcting the discrepancies. The categories will include technician lack of knowledge, miscommunication between the technician and the manager, miscommunication between technicians, typo, etc. See appendix b for screen shot of the database.

good

State Possible Obstacles

The biggest possible problem will be getting the pinnacle software developed to meet our ticket routing and flow. The pinnacle software is a COTS (commercial of the shelf software) and it has been stated that there will be little modification made to the software. The software was sold to us with our understanding that it could do what I needed it to do but it was not a requirement. In order to get this process built in to the system we will have to have procedures in place on how tickets are routed and also how they are worked as well as how they are closed out. This could be difficult because it crosses multiple departments.

Another challenge will be getting the technicians to learn Cisco Works. Many of the technicians have years of experience working with this hardware through a completely different interface and it may be difficult to get them to accept using the new tool. If they go around this procedure then there will be no record of the change.

Status of the Problem

Even as recent as today the WAN group made a mistake with a network modification that caused a problem with the University mainframe communications. This clearly states the need for the change control process to be in place and further shows that a verbal process will not suffice.

A tremendous amount of progress has been made on the Cisco Works portion and it has really allowed us to reach new levels of network performance. This is largely due to the fact that we are in control of that piece of the process and we do all of the development of that tool. It is also because of the tremendous amount of work that has been put in to the development and implementation of the tool.

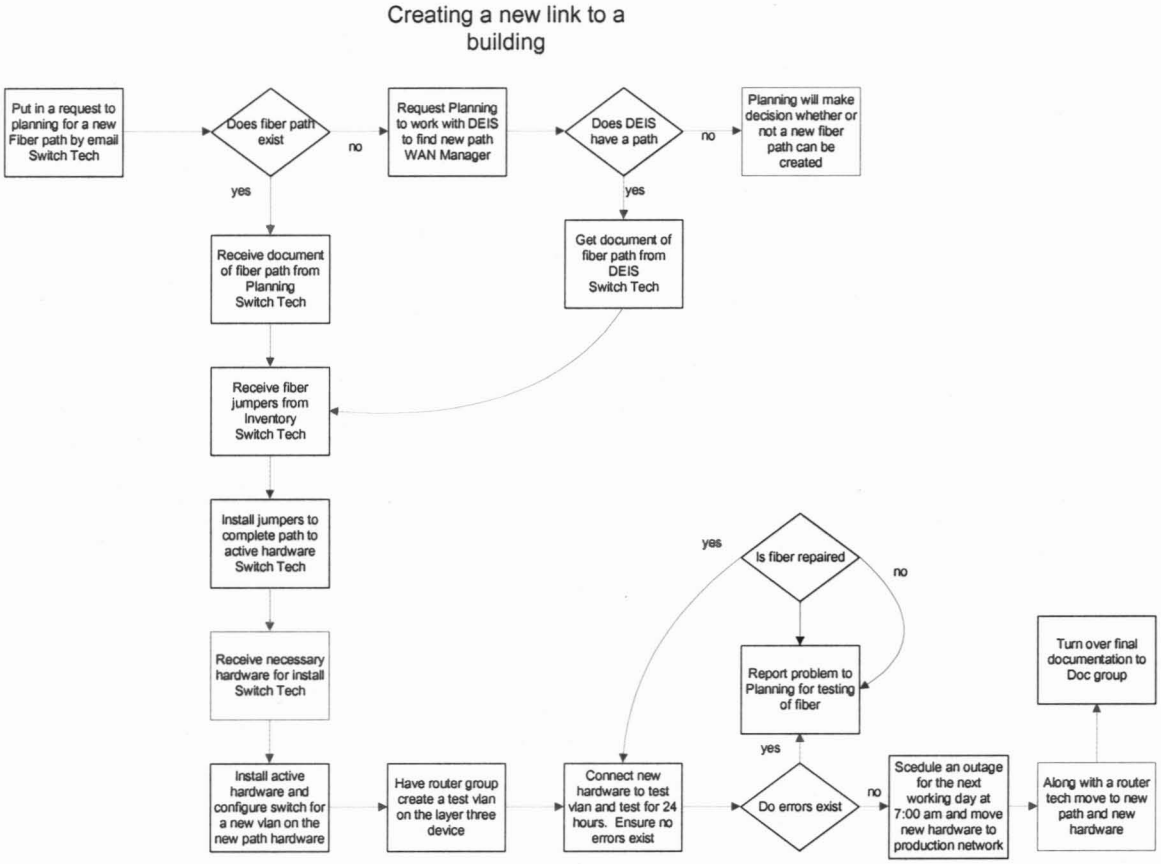
The Pinnacle implementation is moving forward slowly but I believe it will be successful. That is based on the number of key personnel that are involved and the determination of upper management for it to be successful.

Creating the database and recording all requests as well as all errors will help me measure our success. Over time I should see a gradual decrease in the number of errors as compared to the number of requests. This will be easily graphed using the database. Having this information will give me a strong tool for communicating to the technicians the importance of following the processes that the WAN group has in place. It will also force the technicians to consider that prior to making an inappropriate change to the network.

Conclusion

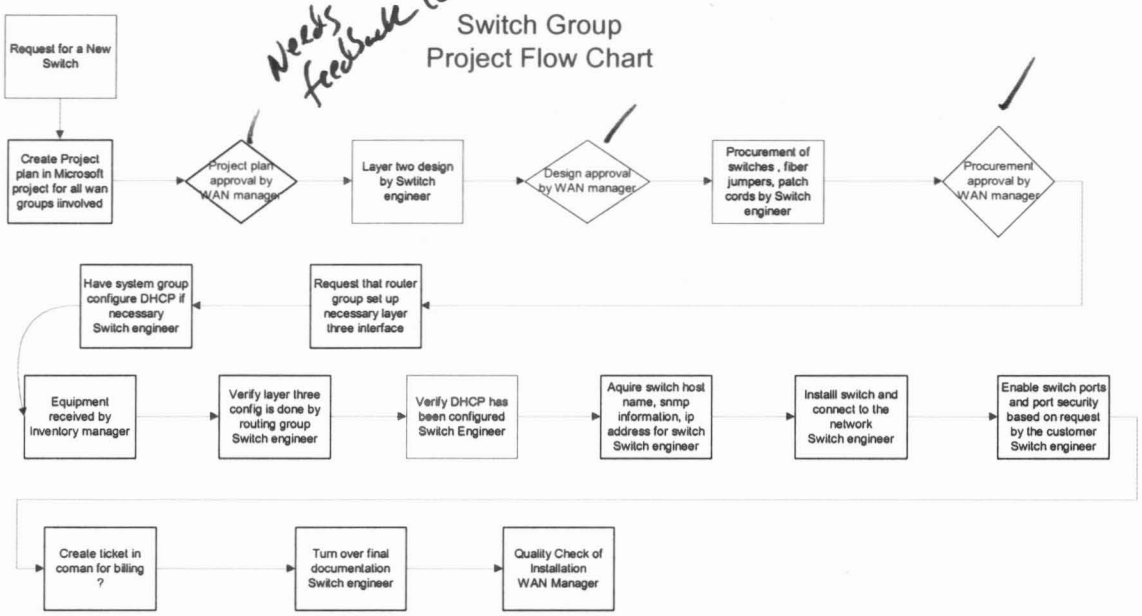
This project has already been a great success. By documenting current processes a dialogue has been opened across departments that otherwise may not have occurred. This channel has helped the WAN group both understand how they impact the other departments as well as inform the other departments the function of the WAN group. There has been a great deal of support from other departments to help this project be successful as they have a buy in. The success of this project eventually touches all 17000 users on the University network, as it will ultimately ensure the timely availability of network resources.

Appendix A

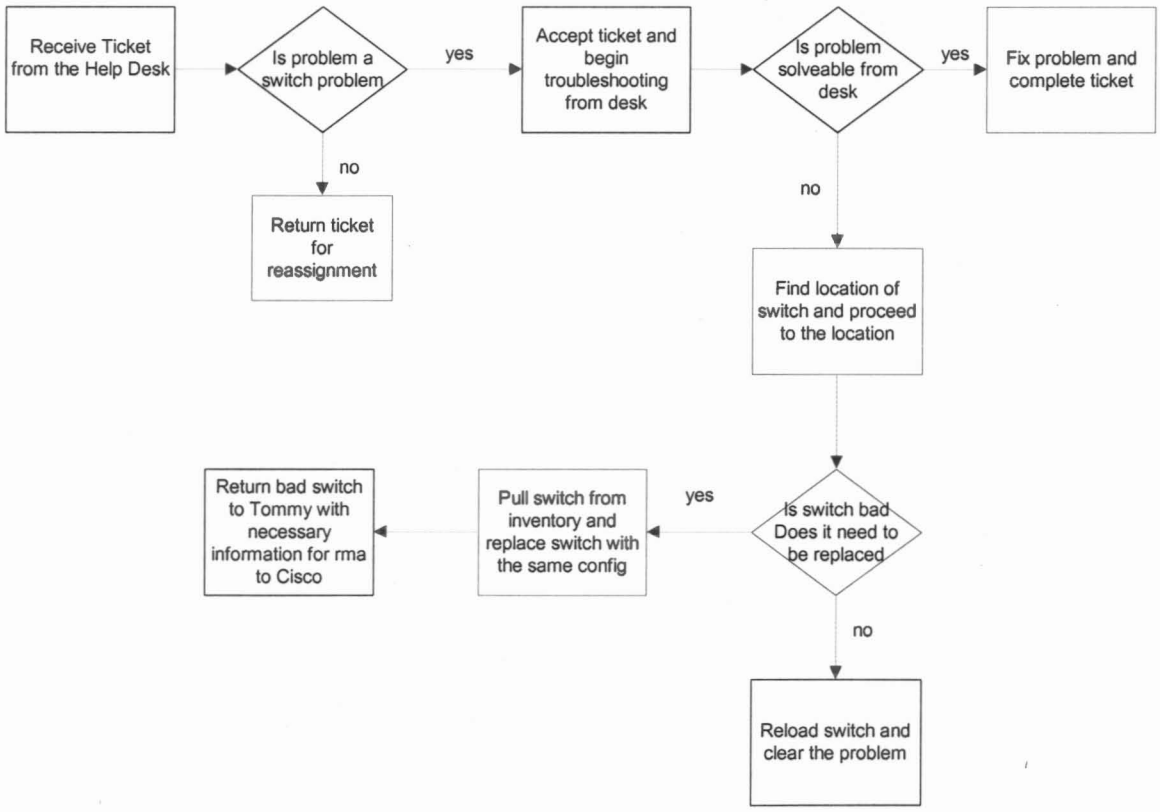


Needs feedback loops

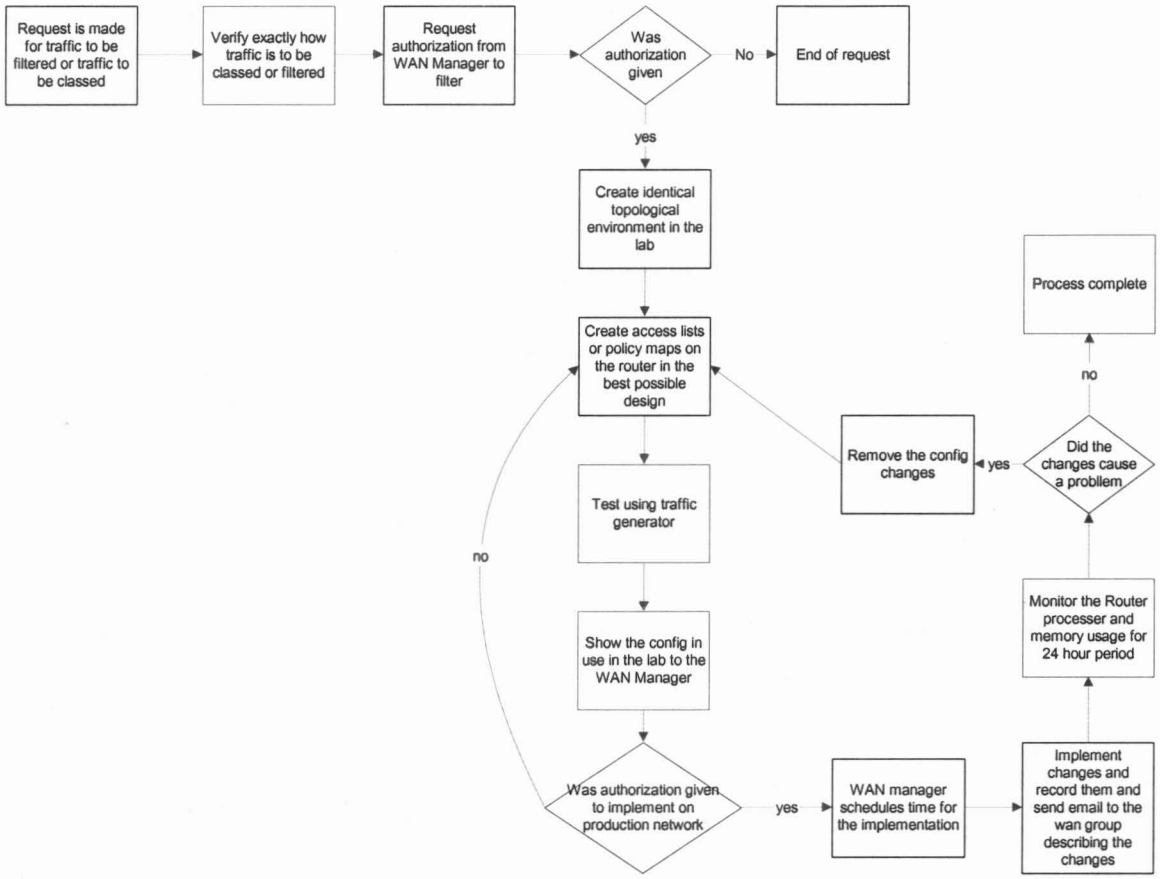
Switch Group Project Flow Chart



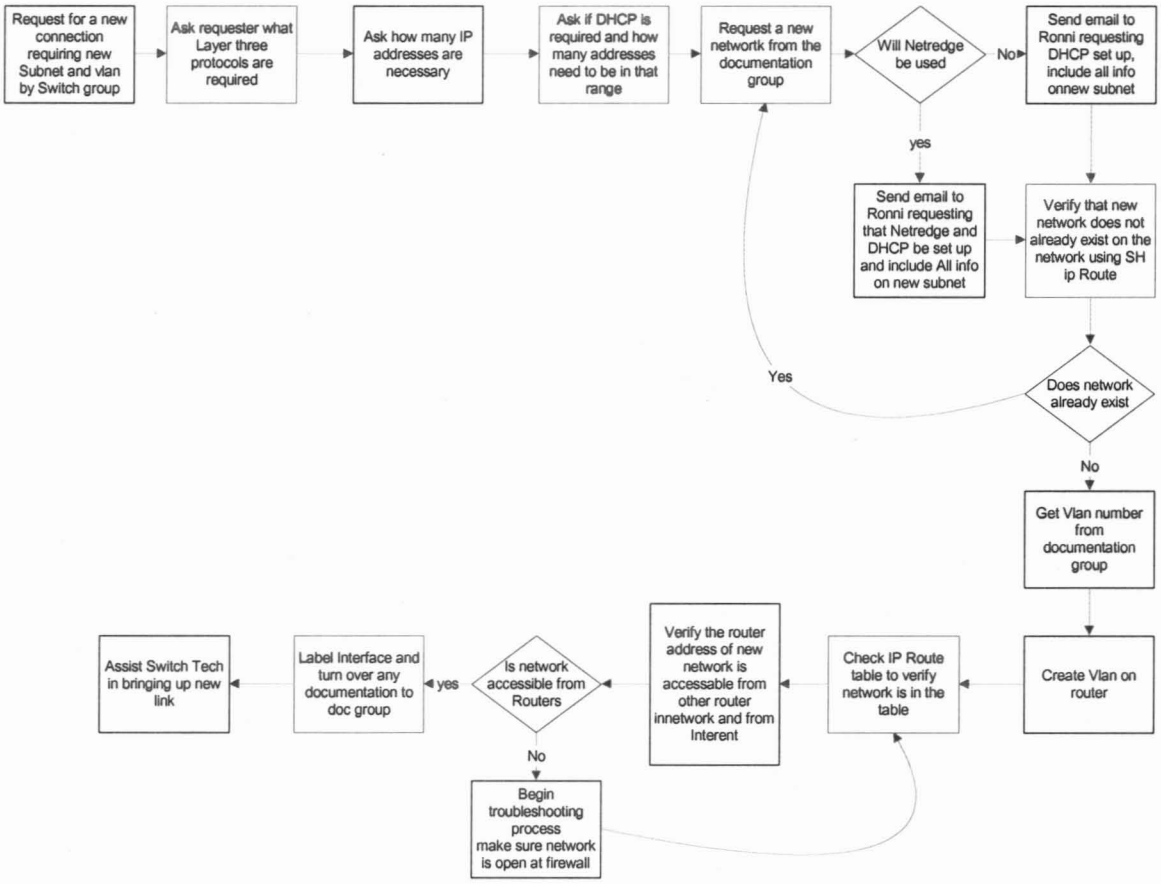
Switch Group Trouble Call



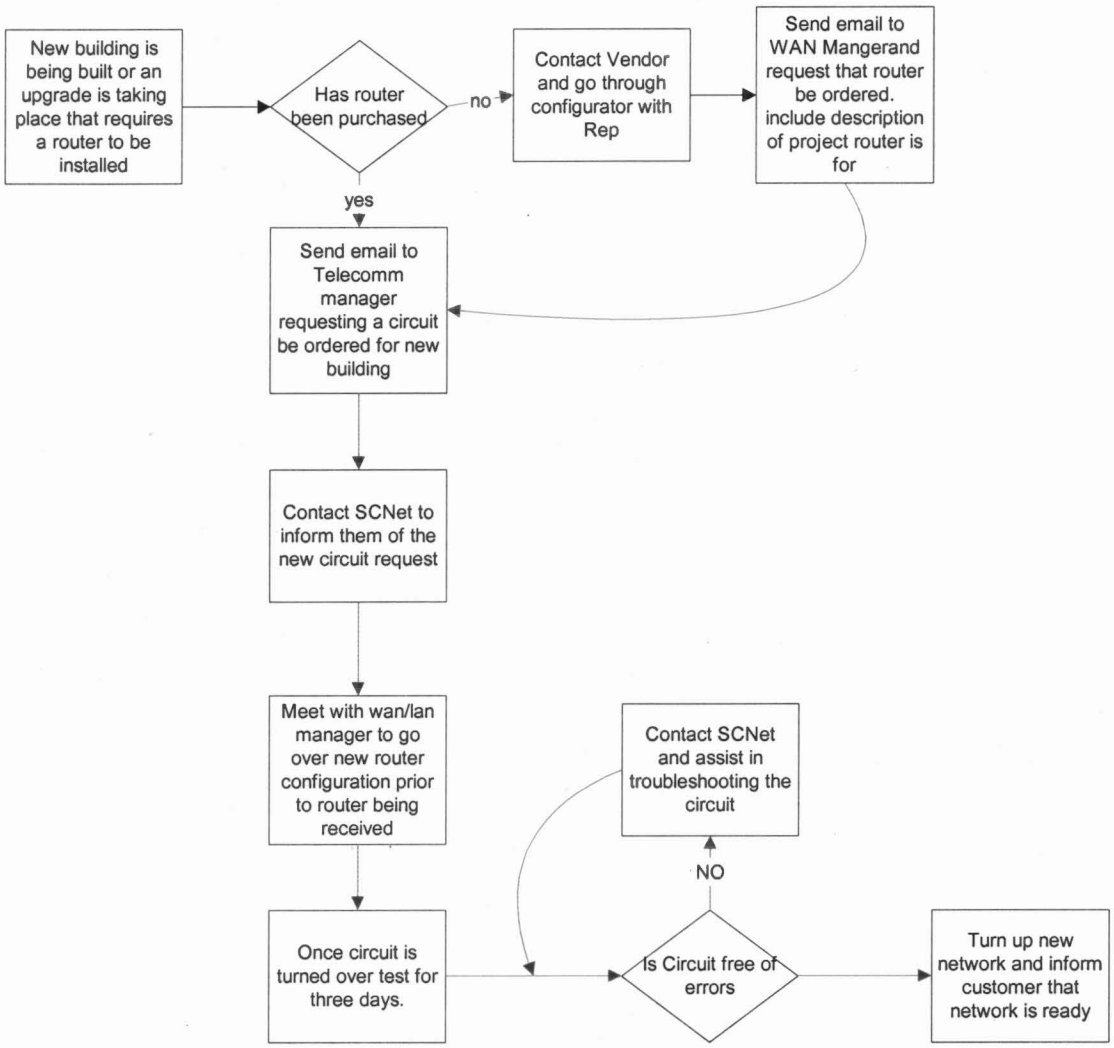
Router group new Access Control list



Router Group New Network



Router group new Router install with wide area circuit or fiber



Appendix B

Microsoft Access - [Error by tech : Table]

File Edit View Insert Format Records Tools Window Help

Fit Close

Error by tech 1/2/2003

ID	Date	Descrip	Cause	Length	Numbers	Descriptio	Repo	Description o	Description of problem reported
1	11/1/2002	Technl	1	45	100	Lack of kn	3	Trouble ticket	
2	3/13/2002		0	0	0		1	New request	Need ap's IP addresses changed in TCL
3	1/2/2002		1	240	35	Lack of kn	3	Trouble ticket	Users in Currel can not connect to Groupwise
4	2/18/2002		0	0	0		3	Trouble ticket	Entire Criminal Justice building can not connect
5	2/18/2002		0	0	0		3	Trouble ticket	Floyd football office at north end of Williams Brice
6	2/18/2002		0	0	0		3	Trouble ticket	One user can not connect in the stadium to the n
7	2/19/2002		0	0	0		3	Trouble ticket	Mainframe controller not connecting to mainframe
8	2/21/2002		0	0	0		3	Trouble ticket	Intermittent problem connecting to network
9	2/21/2002		0	0	0		3	Trouble ticket	One user can not connect to network in McKissic
10	2/22/2002		0	0	0		3	Trouble ticket	One port is not working on a switch
11	1/18/2002		0	0	0		1	New request	Request for fiber strands in Bates Mod
12	2/5/2002		0	0	0		3	Trouble ticket	Allendale's router is taking errors on Ethernet inte
13	2/7/2002		0	0	0		3	Trouble ticket	Floyd building can not connect to server
14	2/14/2002		0	0	0		3	Trouble ticket	Users arew dropping off the network
15	2/7/2002		0	0	0		3	Trouble ticket	Floyd users can not connect to server
16	2/18/2002		0	0	0		3	Trouble ticket	Floyd users can not connect to server
17	2/25/2002		0	0	0		3	Trouble ticket	Bates West users unable to connect to network
18	2/26/2002		0	0	0		3	Trouble ticket	Registrar's office reports network slow
19	3/4/2002		0	0	0		3	Trouble ticket	User is using excessive bandwidth
20	3/5/2002		1	60	20	Lack of kn	3	Trouble ticket	Wireless problem in TCL
21	3/5/2002		1	60	20	Lack of kn	3	Trouble ticket	Wireless problem in TCL
22	3/5/2002		0	0	0		3	Trouble ticket	DNS problem
23	3/5/2002		1	60	20	Lack of kn	3	Trouble ticket	Wireless problem in TCL
24	3/8/2002		0	0	0		1	New request	Need new fiber path to Engineering shop
25	3/8/2002		0	0	0		3	Trouble ticket	FTP wares server
26	2/21/2002		0	0	0		3	Trouble ticket	Can not get to Internet intermittent
27	2/5/2002	Tech d	1	200	1	Lack of kn	3	Trouble ticket	One user can not connect to the network
28	3/8/2002		0	0	0		3	Trouble ticket	FTP wares server
29	4/1/2002		0	0	0		3	Trouble ticket	AS400 not connected to network
30	4/17/2002		0	0	0		3	Trouble ticket	Users on 0th floor ip not working, IPX is fine
31	4/19/2002	Tech r	5	30	1	Other	3	Trouble ticket	User can not connect to network
32	4/24/2002	Tech d	1	30	1	Lack of kn	3	Trouble ticket	User can not connect
33	4/25/2002		0	0	0		3	Trouble ticket	Users dropping network connection

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Ready NUM

Start Novell... Palm ... cpm : ... Error ... 24. Br... CPM P... cpm p... 2:36 PM

Microsoft Access - [Error by tech : Table]

File Edit View Insert Format Records Tools Window Help

Error by tech 1/2/2003

ID	Date	descrip	Cause	Length	Numbers	Descriptio	Repo	Description o	Description of problem reported
34	5/1/2002	Tech	1	60	1	Lack of kn	3	Trouble ticket	No network connection
35	5/2/2002		0	0	0		3	trouble ticket	Authentication problem
36	5/3/2002		0	0	0		3	Trouble ticket	NO internet connection on 1st floor
37	5/7/2002		0	0	0		3	Trouble ticket	AS400 can not connect
38	5/13/2002		0	0	0		3	Trouble ticket	AS400 not connected to network
39	5/13/2002	Tech	1	120	5	Lack of kn	3	Trouble ticket	Staff in Capstone are down
40	5/9/2002		0	0	0		3	Trouble ticket	AS400 Down
41	5/6/2002		0	0	0		3	Trouble ticket	Wade Hampton down
42	5/13/2002		0	0	0		3	Trouble ticket	Byrnes down
43	5/30/2002		0	0	0		3	Trouble ticket	Aiken Internet down
44	5/31/2002	Tech	1	20	2	Lack of kn	3	Trouble ticket	Two us ers down in tol
45	6/4/2002		0	0	0		3	Trouble ticket	User down
46	6/5/2002		0	0	0		3	Trouble ticket	User down in development
47	6/5/2002	Tech	1	30	50	Lack of kn	3	Trouble ticket	Users down
48	6/5/2002		0	0	0		3	Trouble ticket	All users in tol down
49	6/6/2002		0	0	0		1	New request	Connect new station to network
50	6/4/2002		0	0	0		1	New request	Connect new mainframe to network
51	6/6/2002		0	0	0		3	Trouble ticket	Subnet 42 down
52	6/7/2002		0	0	0		3	Trouble ticket	Server down in development
53	6/6/2002		0	0	0		3	Trouble ticket	Printer will no print
54	6/7/2002		0	0	0		3	Trouble ticket	User down
55	6/14/2002		0	0	0		3	trouble ticket	Internet slow
56	6/17/2002		0	0	0		3	Trouble ticket	No connection
57	6/20/2002		0	0	0		3	Trouble ticket	Network down
58	6/20/2002		0	0	0		3	Trouble ticket	AS400 down
59	6/20/2002		0	0	0		3	Trouble ticket	DuplicATE ip
60	6/18/2002		0	0	0		1	New request	Set up wireless card
61	6/20/2002	Install	1	200	20	Lack of kn	3	Trouble ticket	Can not connect to server
62	6/20/2002		0	0	0		3	Trouble ticket	Can not connect to server
63	6/21/2002		0	0	0		3	Trouble ticket	Not on network
64	6/24/2002		0	0	0		3	Trouble ticket	Can not get on network
65	6/24/2002		0	0	0		3	Trouble ticket	Can not connect to network
66	6/24/2002		0	0	0		1	New request	Need to be converted to Ethernet

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Ready

Appendix C

IRIS Problem Reporting and Support Request System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://iris.csd.sc.edu/TicketSystem/hdprereq/ConsoleCustomer.asp Go Links

Computer Services

computer service's
next generation customer care agent

IRIS Problem Reporting and Support Request System

IRIS Customer Support Console

Outstanding Tickets

Ticket: 242463 view status
Customer Name: Dan Gallagher Phone: 803-777-9517
Created By: Tommy Knight Phone: 803-777-2141
Date: 12/11/2002 4:15:59 PM
Status: Assigned
Request:
PARTS ONLY: Request to order telephone for Anthony Duncan. Tel# 777-7457. Model# 825 Telephone.

Ticket: 241703 view status
Customer Name: Dan Gallagher Phone: 803-777-9517
Created By: Pamela Stokes Phone: 803-777-5302
Date: 11/18/2002 8:34:26 AM
Status: Assigned
Request:
needs to have win2K reinstalled on computer.

Ticket: 235307 view status
Customer Name: Dan Gallagher Phone: 803-777-9517
Created By: Dan Gallagher Phone: 803-777-9517
Date: 7/3/02 10:34:03 AM
Status: Assigned
Request:
Need to have two telephones turned on for incoming calls and long distance. The numbers are 576-6206 Dave Duncan, cube #35 and 576-6220 Dan Gallagher Ofc #101. Dept/fund to be charged is 65220 E006. Email confirmation attached.

create ticket

create a ticket for yourself

update information

update your demographic information

Other Options...

create ticket for another person

billing standards

view the system outage center

view all tickets created for you or by you

logoff of the iris system

Check the Status of Your Tickets

Enter a ticket number below and click 'Go'.

Go

http://iris.sc.edu/ Internet

Start Novell... Palm ... cpm : ... 24. Br... CPM P... cpm p... IRIS ... 2:38 PM

Computer Services Computer Services Problem Reporting and Support Request System - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://iris.csd.sc.edu/TicketSystem/shared/TicketSelectType.asp?CustomerID=710 Go Links

Computer Services

computer service's
next generation customer care agent

IRIS Problem Reporting and Support Request System

What Type of Help Do You Need?

Select the type of assistance needed by clicking the button next to your selection. Continue by clicking the button at the bottom labeled " Next Step".

Assistance Using Software Applications or With My Operating System
Choose this selection for phone assistance on such software packages as Microsoft Office, Internet applications, MAC Operating Systems, Windows Operating Systems, the mainframe (IMS, CMS, data files, etc), LISTSERV, VIP, USC Network Username/PW, student email, student access to Blackboard, GroupWise, or Virus Protection for your workstation.
Selecting this option will direct your request to consultants in IT Training and Support and Academic Support.
Note: Please direct account creation requests to "Assistance with network connections..." below.

Assistance With Network Connections, On-Site Software Installations, or MainFrame/Groupwise/Network Account Requests/PassWord Problems
Choose this selection if experiencing network problems (i.e. - connecting to the internet or network), user account information is needed, or field support for your workstation or printer is needed. Selecting this option will route the ticket to the network support group.

Assistance With my Phone, Phone System or Voice Mail
Choose this selection for phone service requests: activation, changes, problems, or assistance and voice mail requests: activations, changes, problems, or assistance.

I Do Not Know to Whom This Support Ticket Should Be Routed
Select this option only if you are not sure what area in Computer Services should assist you with your problem or question. If at all possible you should make a selection above.

Next Step >>

Internet

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Supplying Account Information

We require that you supply the account information for your department. This support ticket cannot be completed without the necessary account information.

Providing account information does not necessarily mean that the support request will result in billable charges. If the service is determined to be billable, the account number supplied will be charged.

If you do not know your account information, please contact your departmental manager.

Our records indicate that your department, CSD - ALL DEPARTMENTS, is currently under the CS DeskTop Support Plan. Thank you for taking part in this support agreement with Computer Services. We will prioritize your support request in our support system.

Please enter your department and fund number:

65220 A000

Next

Cancel

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Validating Your Account

Our records show that **65220 A000, COMMUN-ADMIN & INFRASTRUCTURE** , is an active account. Thank you for providing this information.

[continue with your ticket] [cancel]

Internet

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