

## Design and Implementation of Intelligent Network Configuration Tool

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**Abstract:** The telecommunication companies are providing network services through managing thousands of active components scattered over the network. The lack of centralized management system results in spending many hours for small functions such as upgrading or downgrading of the customer internet subscriber's bandwidth because engineers and technicians need to access the network devices. This study presents an intelligent centralized network configuration tool "The NetCat" to manage the services related to network without physically accessing the network devices. The tool is expected to reduce the human error and update on bulk basis to save the man power and meet the business requirements in a competitive environment.

**Key words:** Automation, human error, minimization, centralized management, related, telecommunication

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### INTRODUCTION

A network management tool hardware or software allows an IT professional to supervise the individual components of a network within a larger network management framework. Bandwidth management that focuses on network performance is one of the important issues today in computer engineering applications and systems mainly in network management. By controlling the amount of bandwidth to an application or user, the network administrator can prevent a small number of applications or users to consume all available bandwidth. The tool may assist in identifying what devices are present on a network, monitoring at the device level to determine the health of network components and the extent to which their performance matches capacity plans, tracking performance indicators such as bandwidth utilization, packet loss and receiving configurable alerts that will respond to specific network scenarios by paging, emailing, calling or texting a network administrator.

The internet applications have become a very bandwidth demanding in recent years and further increase is expected in future. The varied and upward demand for broadband in hotels is pushing up the need for bandwidth at an accelerating pace (DU, 2010). A study carried out for infrastructure and networking supplier Cisco in 2010 suggested that the underlying rate of growth was around 4.4% per month (DU, 2010). This is equivalent to an annual CAGR of around 60%. The multimedia applications are challenging the internet operators to provide more internet bandwidth and faster downloads for the large

files such as movies and the online gaming is putting a big load on the internet backbone. By increasing the capacity available in a burst to address a spike of usage, hotel and restaurant premises can provide the highest speed internet access to guests without having to commit to the expense of a bigger broadband pipe (Visual Studio, 2010). It has become a challenging task for the operators to upgrade the internet speed individually for their subscribers on demand as it is a time consuming and it requires a large number of man power.

The network configuration tools "The NetCat" presented in study is a combination of hardware and software designed in visual Basic Version 6.0 (Visual Studio, 2010) that allow to a technician sitting on his/her desk to send network command to any active components remotely using TCP/IP (Hoffer *et al.*, 2011) protocol and using Telnet port 25 as application layer using GUI. "The NetCat" facilitates in handling the day to day operations of an internet service provider such as minimizing the operational expenses by reducing the cost of the man power, ensure better service delivery by carrying a massive change on a timely manner, etc. "The NetCat" can easily be integrated with existing network management tools. The remainder of the study is organized as follows.

### "THE NetCat" SYSTEM LOGICAL MODEL

The system development life cycle (SDLC) is an essential process uses during the development of any system (McMurtrey, 2013; Kassim and Kassim, 2011). SDLC consists of four main phases. They are planning,

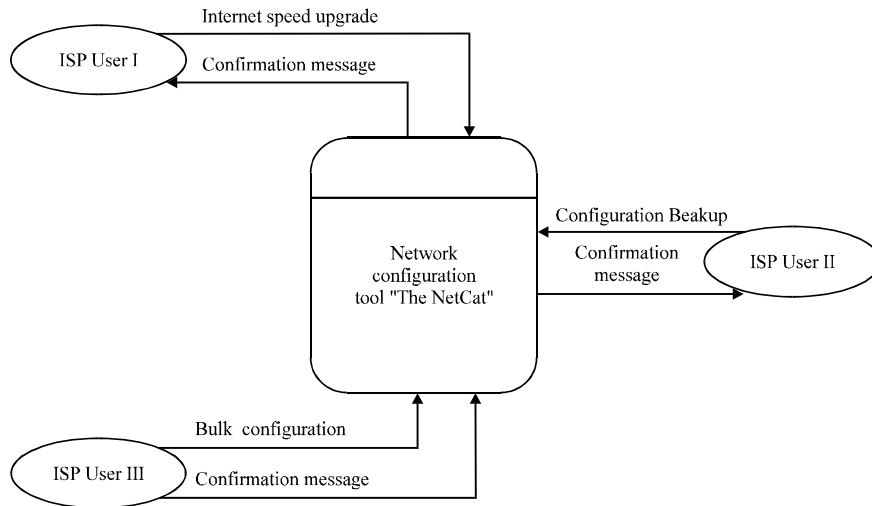


Fig. 1: The NetCat context level DFD with configuration

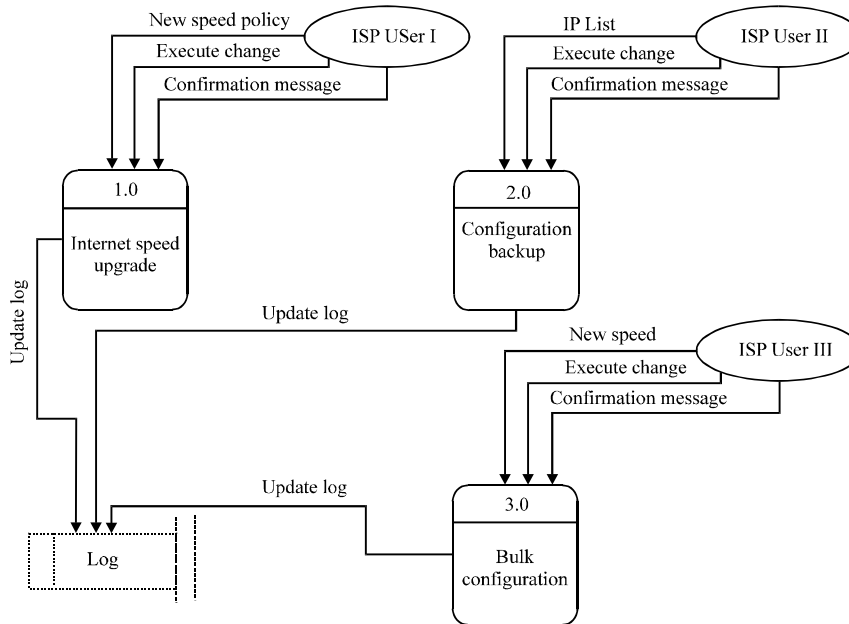


Fig. 2: The NetCat context level DFD with log

analysis, design and implementation. During analysis phase, context diagram and data flow diagrams are used to produce the process model of a system and Data Flow Diagram (DFD) is widely used during analysis phase to capture the requirements of any system [NetCat-DFD]. A context level DFD is the most basic form of DFD and its aim to present how the entire system works at a glance. There is only one process in the system and all the data flows either into or out of this process. The context level DFD's demonstrates the interactions between the process and external entities and they do not contain data stores (Eternal Sunshine of the IS Mind, 2013). The context level DFD of the proposed system is shown in

Fig. 1. There are three types of users; ISP User I, ISP User II and ISP User III, who will interact with the NetCat configuration system for different purposes. The dataflow from each user to the system and backward is also shown in Fig. 1.

The level 1 DFD's aim is to give an overview of the full system and such diagrams look at the system in more detail. The major processes are broken down into sub-processes and it also identifies data stores that are used by the major processes. The level 1 DFD of the systems is shown in Fig. 2. The users of the system can enter new policy, new IP list and new script to be executed for the required

changes. The relevant sub-processes do the required task, send the confirmation message and update the logs.

### “THE NETCAT” SYSTEM

The application starts with a splash screen with a brief description of the tool capabilities and with a warning for the user to make sure that user is aware of the actual functions of the tool. The second main interface (main menu) as shown in Fig. 3 appears if user is successfully logged in the system. This interface presents all of the functionalities of the system which could be invoked through different buttons. The flow of the steps undertaken to upgrade the internet speed is shown as a flowchart in Fig. 4. The user can perform an automatic backup of the running configuration of all the devices using the “Configuration Backup” button as follows:

- Logon to the “The NetCat” system
- Press “Configuration Backup” button
- Application will then TELNET to the entire network devices according to the pre-stored list of the devices IP addresses
- Application will perform a network command to copy the running configuration and save it under a pre-specified folder namely “Configuration Backup”
- A message box will popup notifying the user that the backup is completed

When the user is done with whatever operation (speed upgrade, bulk configuration or configuration

backup) and he needs to check the status of the previous transactions. The logs are also maintained for this purpose. To see the logs, the user will:

- Open the “The NetCat” application
- Click on logs
- Then check the correspondence file according to the date of the activity
- Save them or take them on a notepad

In the following paragraphs we present some of the GUIs snapshots of the systems. When a user clicks on Switches List button a dialog box as shown in Fig. 5 appears asking the user to add the new IP list that the “The NetCat” will access to send the configuration.

To amend or change the configuration of the interfaces that will apply to all switches click on the “Interface List” and a dialog box as shown in Fig. 6 will appear to complete this task. The interface level is used to store and save the commands which are needed to be applied on the interfaces such as the VLAN ID, the description or the new speed if required.

The same will applied for all interfaces by one click and the tool will telnet to all devices and do the needful. This is shown in Fig. 7.

The system also provides functionality to view and verify the logs by clicking on the view logs button as shown in Fig. 8. It is very useful interface which can show you if the tool was unable to reach any switch from the list due to network connectivity issue.

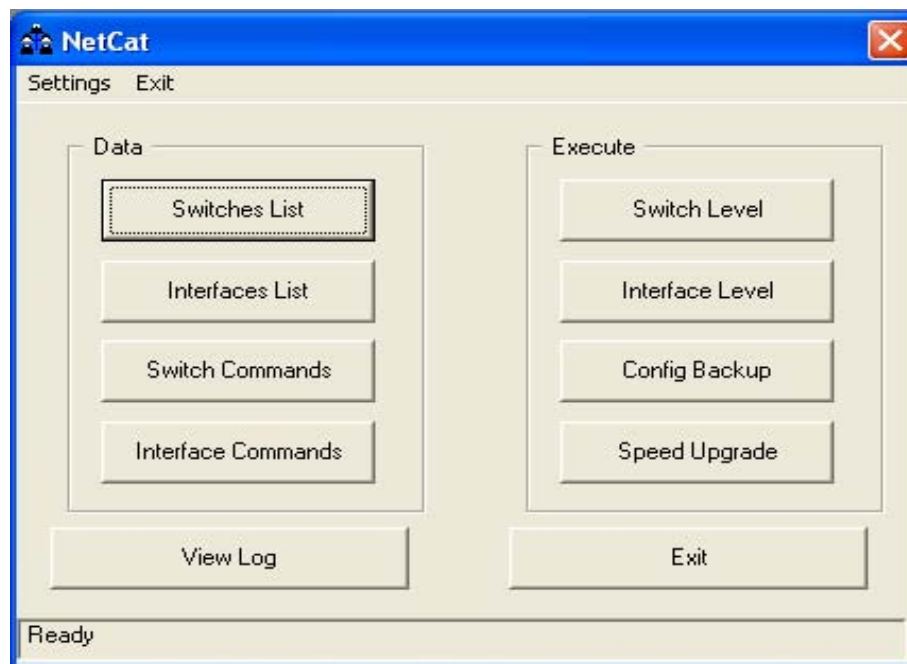


Fig. 3: The NetCat Main GUI

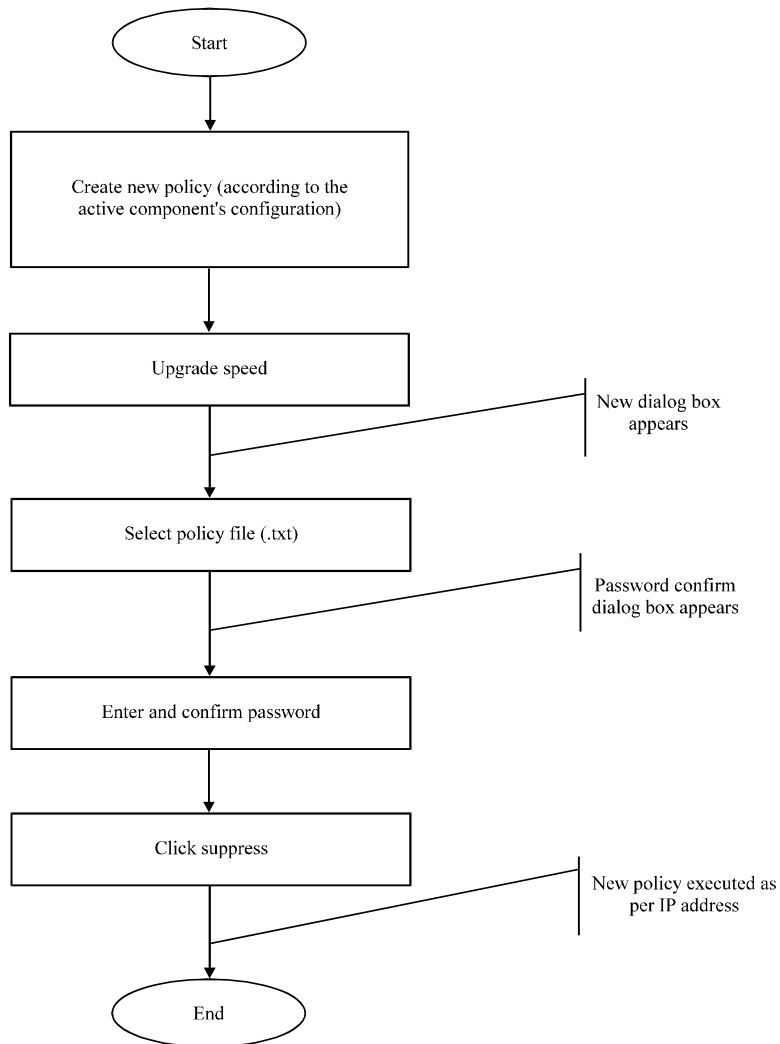


Fig. 4: The NetCat context level DFD

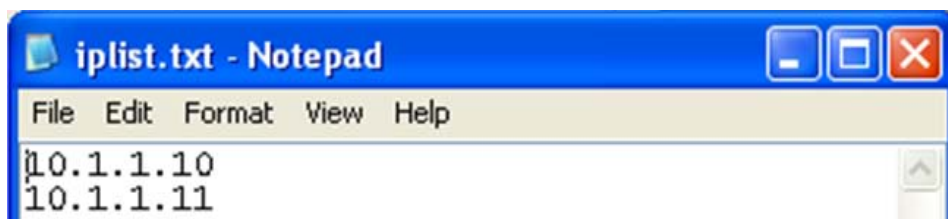


Fig. 5: New IP add dialog box



Fig. 6: Select interface dialog box

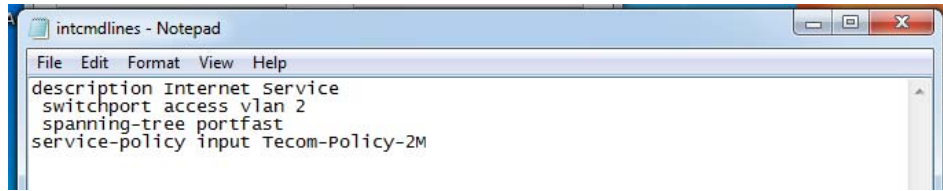


Fig. 7: Interface level dialog box

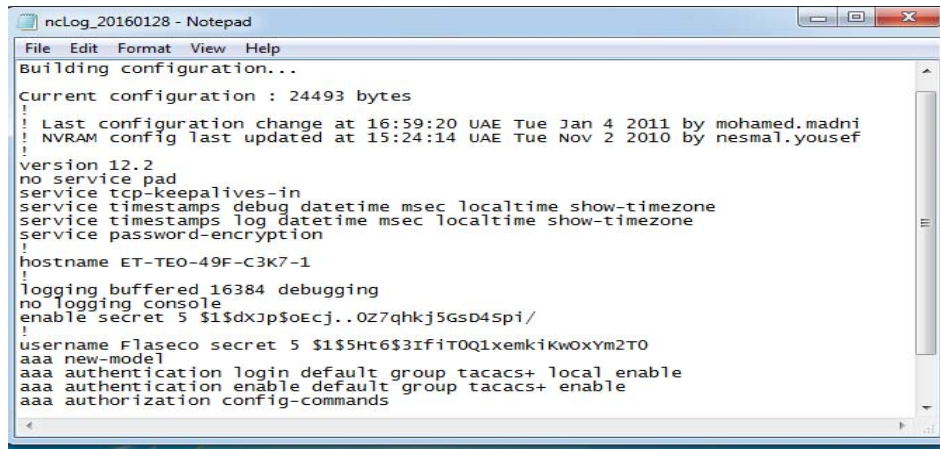


Fig. 8: View logs GUI

## CONCLUSION

This tool can be considered as the core of future network management system. With continues work and development, integrating it with other in house developed systems it will make a powerful tool.

Overall, it is the easy for the network engineer to utilize such tool as it is compatible with any manageable network device that supports TCP/IP and telnet session. The tool is customizable for adding more functionality such as readymade buttons with pre-programmed scripts to enhance the scalability of the tool.

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