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12. Blatt Praktikum Protokolldesign WS 07/08

Aufgabe 1: (50 Punkte) **Verläßlicher Datentransfer: RDT 3.0 über UDP:**

In dieser Aufgabe soll der RDT 2.2 Sender des letzten Blattes auf RDT 3.0 erweitert werden. Das heißt neben Bitfehlern (Packet Corruption) können jetzt auch Paketverluste (Packet Loss) und längere Delays auftreten.

Der RDT-Empfänger ist der gleiche wie auf dem letzten Blatt, außer, dass er jetzt mit
`/afs/net.t-labs.tu-berlin.de/home/praktikum/daten/11.uebung/empfaenger rdt30`
zu starten ist. Als Timeouwert soll **0.2 Sekunden** verwendet werden.

Die folgenden Angaben sind die selben wie auf dem letzten Blatt: Dein Programm sollte für **jedes** gesendete *und* empfangene folgende Daten ausgegen:

- ob es gesendet oder empfangen wurde
- (bei Versand:) warum es gesendet wurde (z.B. neues Paket, Retransmit)
- (bei Empfang:) was es bedeutet, dass wir es empfangen haben, und unsere geplante Reaktion
- (bei Empfang:) ob es corrupt ist
- welche Sequence Number / ACK-Nummer es trägt
- wieviele Bytes an Nutzdaten es überträgt, also ohne die ganzen UDP- und RDT 3.0-Headerinformationen.
- die enthaltenen Nutzdaten, falls vorhanden

Pakete sollen über einen UDP-Socket versendet und Empfangen werden und sehen folgendermaßen aus:

- 2 Bytes Sequence Number (bei Paketen, die Du versendest) bzw. ACK-Nummer (bei ACK-Paketen, die der Empfänger versendet)
- 2 Bytes Checksumme
- 2 Bytes Länge der anschließenden Nutzdaten in Bytes
- Rest Nutzdaten (evtl. leer)

Die Headerdaten sind dabei in Netzerkbyteorder (erst Hi-Byte, dann Lo-Byte) gespeichert. ACK-Pakete, die vom Empfänger zurückkommen, tragen keine zusätzlichen Nutzdaten. Die Checksummenfunktion ist schnell erklärt: Ein ‚heiles' Paket hat als ‚Checksumme' immer und unabhängig von seinem Inhalt `0x4f4b`, ein defektes Paket dagegen irgendeinen anderen Wert[1]. `:-)`

[1] Das ist natürlich keine ‚echte' Checksummen-Funktion. Ihr sollt auf diesem Blatt aber ein Transportprotokoll implementieren und keinen Prüfalgorithmus

Abzugeben sind:

- Dein Programm (sowohl Quelltext als auch ggf. compiliert im Falle von C, C++ und Java)
- Die Konsolenausgabe Deines Programms im ‚geschwätzigen' Modus bei einer kurzen Beispielsession. Es sollte daraus hervorgehen, dass Dein Programm mit Corruption umgehen kann.
- Die zugehörige Konsolenausgabe des Servers von der gleichen Session, ebenfalls im ‚geschwätzigen' Modus[2]
- Ggf. eine Beschreibung, was funktionieren sollte, dies leider aber immer noch nicht tut...

Aufgabe 2: (0 Punkte) **Perspektiven zu IPv9**

Arbeite Dich in das RFC 1606 (siehe unten) ein und beantworte folgende Fragen:

(a) Erkläre die Interaktionen des Routingprotokolls mit den Routing Levels anhand der Netzwerke 4f:70:65:72:61:74:69:6f:6e::::::: und 4d:69:6e:64:66:75:63:6b::::::::

(b) Umreiße die Möglichkeiten zur Immanetisierung des Eschatons unter Zurhilfenahme der geplanten Protokollerweiterungen.

Request for Comments: 1606, J. Onions

A Historical Perspective On The Usage Of IP Version 9

Status of this Memo

This memo provides information for the Internet community. This memo does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Abstract

This paper reviews the usages of the old IP version protocol. It considers some of its successes and its failures.

Introduction

The take-up of the network protocol TCP/IPv9 has been phenomenal over the last few years. Gone are the days when there were just a few million hosts, and the network was understood. As the IP version 9 protocol comes to the end of its useful life, once again due to address space exhaustion, we look back at some of the success of the protocol.

Routing

The up to 42 deep hierarchy of routing levels built into IPv9 must have been one of the key features for its wide deployment. The ability to assign a whole network, or group of networks to an electronic component must be seen as one of the reasons for its takeup. The use of the Compact Disk Hologram units is typical of the usage. They typically have a level 37 network number assigned to each logical part, and a level 36 network number assigned to the whole device. This allows the CDH management protocol to control the unit as a whole, and the high-street vendor to do remote diagnostics on discreet elements of the device. This still allows sub-chip routing to be done using the 38th level addressing to download new nanocode. As yet, no requirement has been found for levels 40-42, with level 39 still being used for experimental interrogation of atomic structure of components where required.

Allocation

The vast number space of the IPv9 protocol has also allowed allocation to be done in a straight forward manner. Typically, most high street commercial internet providers issue a range of 1 billion addresses to each house. The addresses are then dynamically partitioned into subnet hierarchies allowing groups of a million addresses to be allocated for each discreet unit (e.g., room/floor etc.) The allocation of sub groups then to controllers such as light switches, mains sockets and similar is then done from each pool.

The allocation process is again done in a hierarchical zoned way, with each major application requesting a block of addresses from its controller. In this way the light bulb requests an address block from the light switch, the light switch in turn from the electrical system which in turn requests one

[2] Dazu den Server mit
`/afs/net.t-labs.tu-berlin.de/home/praktikum/daten/11.uebung/empfaenger --verbose rdt2.2` starten

from the room/floor controller. This has been found to be successful due to the enormous range of addresses available, and contention for the address space being without problems typically.

Whilst there are still many addresses unallocated the available space has been sharply decreased. The discovery of intelligent life on other solar systems with the parallel discovery of a faster-than- light transport stack is the main cause. This enables real time communication with them, and has made the allocation of world-size address spaces necessary, at the level 3 routing hierarchy. There is still only 1 global (spatial) level 2 galaxy wide network required for this galaxy, although the establishment of permanent space stations in deep space may start to exhaust this. This allows level 1 to be used for inter-galaxy routing. The most pressing problem now is the case of parallel universes. Of course there is the danger of assuming that there is no higher extrapolation than parallel universes...

Up to now, the hacking into, and setting of holo-recorder devices to the wrong channel from remote galaxies, has not been confirmed, and appears to be attributable to finger problem with the remote control whilst travelling home from the office.

Applications

The introduction of body monitors as IPv9 addresseable units injected into the blood stream has been rated as inconclusive. Whilst being able to have devices lodged in the heart, kidneys, brain, etc., sending out SNMPv9 trap messages at critical events has been a useful monitoring tool for doctors, the use of the blood stream as both a delivery and a communication highway, has been problematic. The crosstalk between the signals moving through the blood stream and the close proximity of nerves has meant that patients suffering multiple events at once, can go into violent spasm. This, coupled with early problems with broadcasts storms tending to make patients blood boil, have led to a rethink on this whole procedure. Also, the requirement to wear the silly satellite dish hat has led to feelings of embarrassment except in California, where it is now the latest trend.

The usage of IPv9 addresseable consumer packaging has been a topic of hot debate. The marketing people see it as a godsend, being able to get feedback on how products are actually used. Similarly, the recycling is much improved by use of directed broadcast, "All those packages composed of cardboard respond please." Consumers are not so keen on this seeing it as an invasion of privacy. The introduction of the handy-dandy directed stack zapper (which is also rumoured to be IPv9 aware) sending directed broadcasts on the local food package net effectively resetting the network mask to all 1's has made this an area of choice.

The advent of the IPv9 magazine was universally approved of. Being able to ask a magazine where its contents page was the most useful of the features. However combined with the networked newspaper/magazine rack, the ability to find out where you left the magazine with the article that was concerned with something about useage of lawn mowers in outer space is obvious. The ability to download reading habits automatically into the house controller and therefore alert the reader of articles of similar ilk is seen as marginal. Alleged querying of this information to discover "deviant" behaviour in persons within political office by members of contending parties is suspected

Sneakernet, as pioneered by shoe specialists skholl is seen to be a failure. The market was just not ready for shoes that could forward detailed analysis of foot odour to manufacturers...

Manufacture

Of course, cost is one of the issues that was not considered when IPv9 was designed. It took a leap of imagination to believe that one day anything that wished to be could be IPv9 addresseable. It was assumed that IPv9 protocol machines would drop in price as with general chip technology. Few people would have forseen the advance in genetic manipulation that allowed viruses to be instructed to build nano-technology IPv9 protocol machines by the billion for the price or a grain of sugar. Or similarly, the nano-robots that could insert and wire these in place.

The recent research in quark-quark transistors, shows some promise and may allow specially built atoms to be used as switches. The manufacture of these will be so expensive (maybe up to 10cent an IPv9 stack) as to be prohibitive except for the most highly demanding niches.

Conclusions

Those who do not study history, are doomed to repeat it.

Security Considerations

Security issues are not discussed in this memo.

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Details zur Abgabe der Aufgaben: siehe FAQ (unterhalb `http://www.net.t-labs.tu-berlin.de/teaching/ws0708/PD_labcourse/`**)**
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