

Designing TCP/IP Internetworks

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diagnostic tool!*



Geoff Bennett

VNR Communications Library

Designing TCP/IP INTERNETWORKS

Geoff Bennett



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*This book is dedicated
to the memory of my dad
George Bennett*

Designing TCP/IP
INTERNETWORKS

Section 1

DESIGN AND
TECHNOLOGY
REVIEW

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Design Overview

For any project we may identify three major variables; cost, scope and delivery time. The specification of any two of these will cause variation in the third.

The Heisenberg Extended Uncertainty Principle

1.1 What is Design?

Networks and Internetworks are living things. They never really become stable, although they can reach what scientists call a "steady state." When you begin the design process, you may think that it has an end point. It hasn't, because real systems simply move from one design phase to another. An example of this is drawn in Figure 1.1.

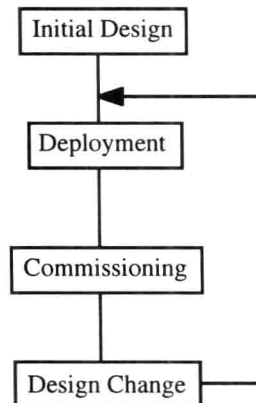


Figure 1.1: Ongoing Design

This chapter presents a personal approach to design. I've listed two reports that may be interesting as comparative reading in the references [1, 2].

2 Designing TCP/IP Internetworks

1.1.1 The Users and The Providers

One of the key philosophies to remember is that an internetwork is as much of a company resource as the buildings, the computers and the office furniture. The design process, the selection of equipment, the installation and the ongoing maintenance are all part of the service that the network provider offers to the network users. Decide from the outset to make this process a team effort. Throughout the rest of this chapter, I'll be describing methods and documentation to help you in the design process. However, each stage will require decisions. You must judge whether a particular decision can be taken on your own initiative, or passed to the Management Team for agreement. Remember that an oversight committee will generally sign off on technical decisions providing you give them a clear reason for the decision. Think ahead. If you can't give yourself clear reasons for a particular decision, don't expect to convince anyone else.

Use the Management Team as an arbitration committee between you (the provider of the network) and the users of the network. Remember that the systematic approach will work in your favor.

1.1.2 Using Documents as Tools

For some, documentation is a chore. It's like filing, or writing up meeting minutes. The problem for most people is that they don't know *what* to write, so they end up writing the wrong thing at the wrong time. They include too much useless information, and leave out all the important stuff. Good network documentation should read more like a Tom Clancy novel than an IEEE standard! (Note: My rationale here is that you read an IEEE standard and fall asleep before you learn anything, whereas after reading "Red Storm Rising," I'm now a fully qualified gunner on an M1A1.)

I hate paperwork. The problem is that most large projects simply cannot happen without paperwork and the related procedures. As a designer you've got a simple choice. You can fight the paperwork issue, or you can work with the system to make sure that the paperwork and procedures can be kept to a minimum. In this chapter I'll be suggesting that you create and maintain the following documents:

- The Network Proposal
- The Request for Proposal (RFP) or Request for Information (RFI)
- Service Level Definitions and Agreements
- Site and Network Logs
- Network Maps

And all this from a guy who hates paperwork? There are two things you should consider. First of all, not all these documents need to be created for all possible

networks. Smaller networks don't need a formal RFP or RFI stage. Larger networks may be obliged by law to have them. A Network Map can be as simple or complex as you decide. Service Level Definitions and Agreements are the main point of argument. My experience shows that they can be the best way to clarify what the network is supposed to do and whether it's actually doing it. These documents are the best protection for a Network Designer.

I have to draw on experience again when I say that the Network Proposal ends up saving us paperwork. For small networks, the proposal can start as a two page memo. However, the innovation in this process is that we keep the original Proposal and build onto it during the lifetime of the network. By creating this single document at the start, we can avoid repetitive memos and descriptions during the life of the network. Having the proposal on line is doubly efficient; we can save a few trees by simply referring to specific parts of the document, or using cut and paste features in electronic mail packages.

1.1.3 A Structured Method

Despite the increase in internetworking experience, it still isn't possible to publish an internetworking recipe book. I can suggest a formal methodology that you might like to follow in your design process. This methodology is based on the standard Systems Analysis approach used to design a software system, and it is adapted to the needs of the internetwork. You may decide that some of the stages in the process are too formal for your case. The larger your internetwork project becomes, the more formal the process should be. For large internetworks, the process that I describe will be too general, and specialized project planning and management methodology will be necessary.

In Figure 1.1 I showed a box marked "Initial Design." Figure 1.2 shows a more detailed view of this box.

I'll now cover the steps in the Design Process in a little more detail. At various stages I'll be referring to the documents that I describe above.

1.2 The Design Process

This section is really an expansion of the flow chart I drew in Figure 1.2.