
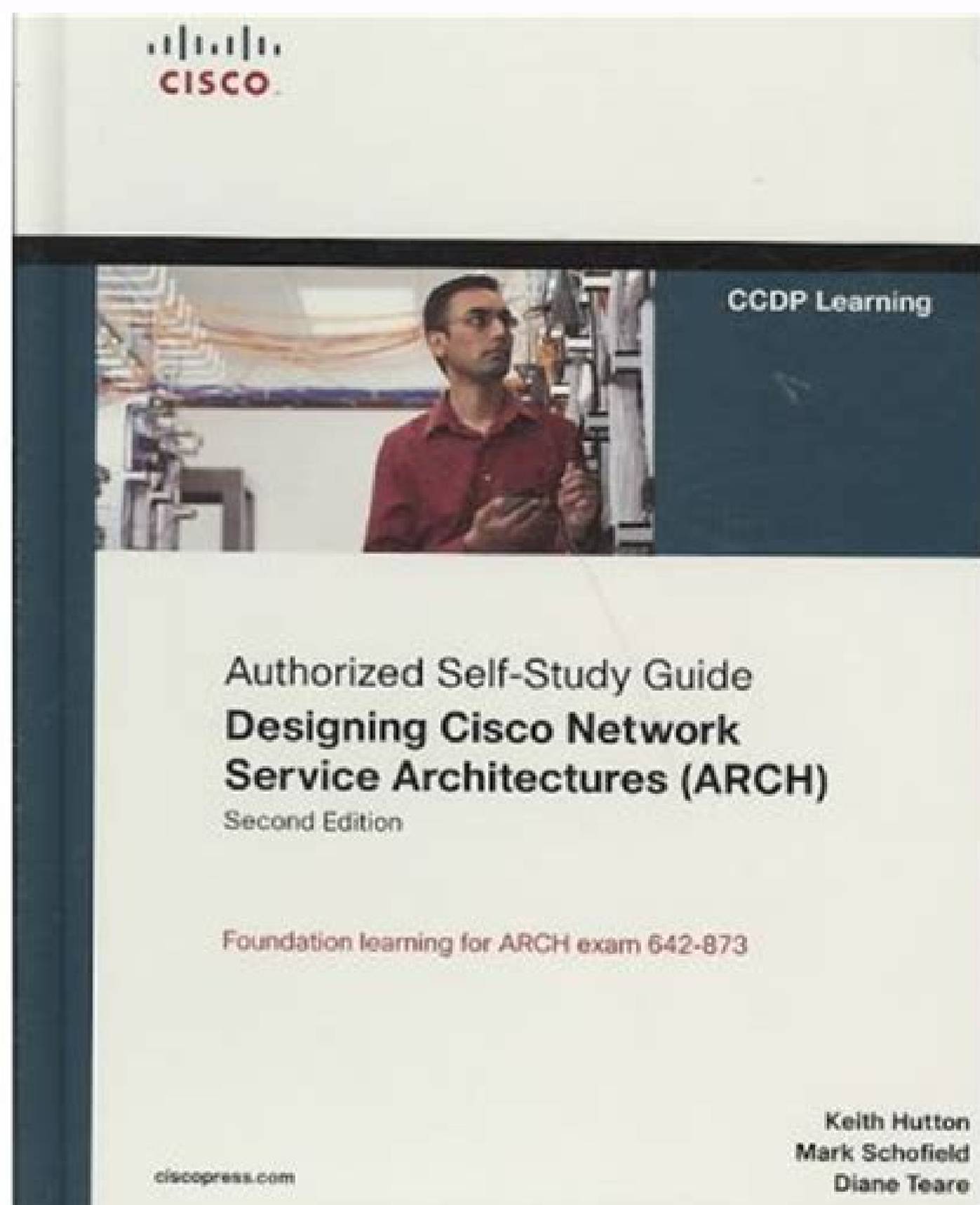


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Network Design Goals 7

the costs will likely rise. However, such costs will be amortized over a longer period of time, thus making each component appear cost effective. Such an undertaking is best approached by informing management of the schedule and long-range plan. Budgets frequently open up when a long-term plan is presented, and designers always want to avoid having a budget cut because a precedent was set by spending too little in the previous year.

The third approach to balancing network cost with usability is to buy cheaper components. A brief word of advice: avoid this approach at all costs. The net impact is that additional resources are required for support, which erodes any apparent savings.

The last approach is to use a billing model. Under this model, all purchases are pooled and then paid for by the other departments. This method can be quite limiting or quite fair, depending on its implementation. Such a model does away with the problem caused by concurrent usage but may leave the IT group with no budget of their own.

Concurrent Usage

Concurrent usage is an interesting concept in network design, as it ignores most other concerns. Imagine that the IT department has a single spare slot on its router and another department (Department A) wants a new subnet.

One approach would be to have Department A purchase the router card and complete the project. However, this approach fails to consider the next request. A month later, another department (Department B) wants the same special deal on a new network segment, but slots there are no open slots.

Department B would need to pay for a new router, power supplies, rack space, wiring, maintenance, and so forth. Department A may have paid \$2,000 for their segment, but Department B will likely generate a bill for ten times that figure. Of course, Department C, making their request after Department B, would benefit from Department B's generosity—their new segment would cost only \$2,000, since there would now be a number of open slots.

Another solution is to fund all network projects from a separate budget—no department owns the interface or equipment under this model. Unfortunately, this solution often leads to additional requests—it is always easier to spend someone else's money. Bear in mind that this solution focuses only on the technical costs. If the designer is asked to spend 20 hours a week for six months on a single department's effort, there will likely be additional expenses.

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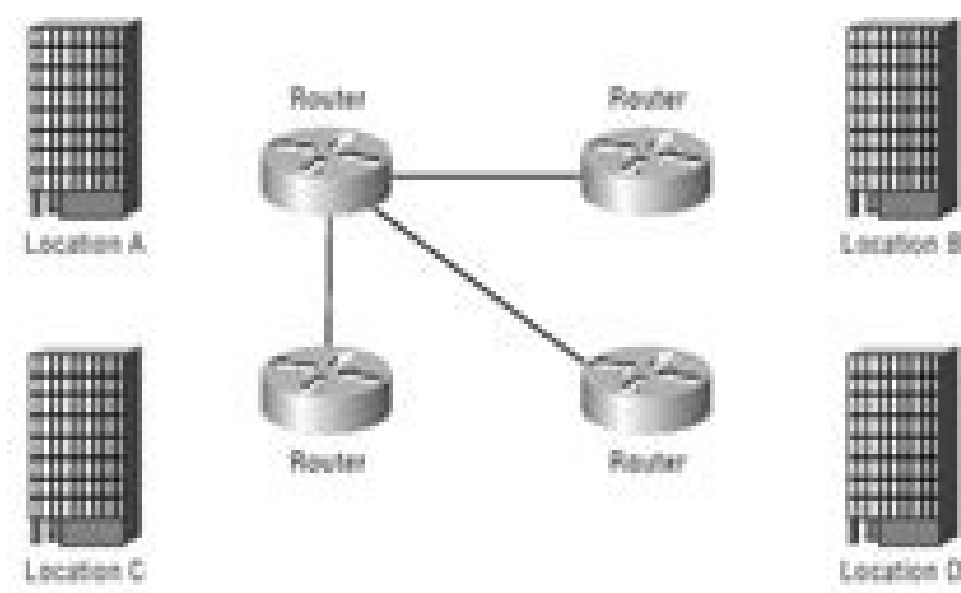
A flat network contains no routers or Layer 3 awareness (Layer 3 of the OSI model). The network is one large broadcast domain. This does not preclude the incorporation of switches or bridges to isolate the collision domain boundaries and, depending upon the protocols in use, it could support up to a few hundred stations. Unfortunately though, this design rarely scales to support the demands of most networks in terms of users, flexibility, and security.

Performance may be only one concern. Typically, the need for access lists (ACLs) and other benefits at Layer 3 in the OSI model will require the incorporation of routers. The flat network model fails to address many of the important factors in network design—the most significant of which is scalability. Consider the impact of a single network interface card (NIC) sending a broadcast onto the network. At Layer 2, this broadcast would reach all stations. Should the NIC experience a fault where it continued to send broadcasts as fast as possible, the entire network would fail.

The Star Network Model

The traditional star topology typically meets the needs of a small company as it first expands to new locations. A single router, located at the company's headquarters, interconnects all the sites. Figure 1.1 illustrates this design.

FIGURE 1.1 The star topology



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He enjoys helping and assessing network designs and architectures; therefore, he was selected as a Cisco Designated VIP by the Cisco Support Community (CSC) (official Cisco Systems forums) in 2012 and by the Solutions and Architectures subcommunity in 2014. Designing for Cisco Network Service Architectures (ARCH) Foundation Learning Guide, Fourth Edition, is part of a recommended learning path from Cisco that includes simulation and hands-on training from authorized Cisco Learning Partners and self-study products from Cisco Press. Marwan holds a Master of Science degree in internetworking from the University of Technology, Sydney. Chapter-ending review questions illustrate and help solidify the concepts presented in the book. In his spare time, Marwan provides CCDP- and CCDE-related training and blogs at netdesignarena.com. André Laurent, 3xCCIE No. 21840, CCDE No. 20120024, is the worldwide director of engineering for enterprise networking sales at Cisco Systems and a Cisco Press author. This book provides you with the knowledge needed to perform the conceptual, intermediate, and detailed design of a network infrastructure that supports desired network solutions over intelligent network services to achieve effective performance, scalability, and availability. This book presents concepts and examples necessary to design converged enterprise networks. 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