D-Link®

The Most
Effective Way
To Refresh Your
Network In 2020

Table of Contents

Part 1

THE BILLION DOLLAR DISASTER

What's the most any of your networking projects ever went over budget?
A few thousand dollars? Tens of thousands? Millions?

What about $1.19 billion?

$1.19 Billion...

That's how much a major networking project went over its originally proposed budget of $6 million while installing a new payroll system in 2006. The system, which was originally scheduled to go live in 2006, wasn't operational until 2010 and ended up costing Queensland a total of $1.2 billion by the time it was completed.

That would be like ordering a $6 cup of coffee, only for it to take four times as long to make and cost $1,200 by the time it was done.

Multiple problems led to the gross overspend and under-execution of the payroll IT project, some of which included poor planning, research, and implementation. It's just one example of how improper planning can lead to disastrous financial consequences on top of a dysfunctional network.

It's also a clear reminder of how important it is that you stay within your budget and deliver

everything that was promised on time. This network refresh guide was designed specifically to plan for any potential problems and as you plan your next project and help you:

- **Upgrade your software and hardware to maximize performance**
- **Improve IT performance and efficiency**
- **Reduce operating expenses**
- **Increase security**
- **Meet compliance standards**
- **Gain an advantage over**

Why You Should Read This Guide From Start to Finish

Over the last 30-plus years, D-Link has worked with Networking and IT professionals on hundreds of thousands of networking projects all over the world. They've ranged from simple network refreshes and network upgrades to aggressive expansions and complete overhauls.

Throughout that time, there's one thing we've noticed over the decades. With so much attention placed on the forefront of IT, we find that very little attention is given to one of the most common networking projects of all—the network refresh.

That's why we put this ebook together. To help you perform your best when undertaking a network refresh. After all, given the pace at which the networking industry changes, even the most seasoned professional could use a little help.

Here's what the guide will do for you.

1 Give You a Repeatable, Actionable Network Refresh Plan

This might not be the first time you're refreshing your network. It probably won't be the last, either. As you stare down the daunting challenge of refreshing your network, use this guide to create a plan for your current project—and your next. It goes beyond the basics of building your network, addressing the budget, performance, security, scalability, and efficiency needs of your network.

2 Give You The Wisdom to Design The Perfect Network on Your Budget

It can be hard to compete with large enterprises when you don't have deep pockets to draw from. With this guide and some elbow grease, you can put together a budget-friendly network that keeps your business competitive now and down the road.

We'll help you address potential issues such as integration, network capabilities, outdated software and products, planning, and training to make the process as smooth and complete as possible.

3 Give You Ammunition to Justify Budget Requests to Your Boss

You may understand the importance of each piece of your network, but it's not always easy getting buy-in from a supervisor and/or corporate decision makers. This guide can serve as a resource to help you justify the importance and cost of your proposal.

4 Give You Tools to Integrate, Train, and Refresh More Efficiently

When you're focused on piecing together the right network within a budget, it can be easy to forget all of the little things that go along with it, such as training staff and testing equipment. We'll help you prepare an integration strategy that plans for all of the small details involved in a project like this.

Preparing Your Network for the Upcoming Trends of 2020 & Beyond

No one can accurately predict the future of networking, but they can make strong assumptions based on previous trends and current information. Despite that, we do know one thing for certain—organizations that plan ahead and embrace upcoming trends see an average gross margin of 55% compared to the 37% growth of those that don't.[1]

The numbers are clear. It's important to embrace a digital network transformation. We've highlighted the trends we see playing large roles in the upcoming world of business and their networks. By focusing on these aspects as you build your network, we believe you can strategically prepare your infrastructure for the evolution of business while maintaining everything you want and need for your network today.

This isn't to say your organization should adopt an agile approach to everything, go all in on SDN (Software-Defined Networking), or move partially or entirely to the cloud. Organizations are unique and there are always some organizations that have no need for one or more of these solutions.

But what is truly important is to be aware of what's going on so you can make the most informed decision possible for your network needs. **So let's get started.**

Cybercrime is Rising for All Networks

Damages from cybercrime are expected to cost businesses $6 trillion by the year 2021.[2] It's not just large enterprises either. Cities are being attacked, too. The town of New Haven recently coughed up $2,000 to "restore access to its computer system after a ransomware attack."[3] The attack came from outside the U.S.

One of the driving forces behind the increase in attacks and the costs associated with them are IoT devices. The more devices connected to your network, the more entry points there are for hackers.

Takeaways
Prepare your network for the growth of IoT and the potential cybercrime associated with it.

IoT Security and Management is Increasing in Complexity

As previously mentioned, many industries are quickly adopting IoT devices in their everyday business operations. Retail, healthcare, and manufacturing are all using the data collected from devices to streamline their services and business operations.

Collecting, storing, managing, and analyzing that data presents both practical issues and security concerns. There's also no governing body over the world of IoT devices at the present moment. The security standards and formats used—if used—are up to the manufacturers.

Takeaways
Prepare your network for the growth of IoT devices, fluctuating security standards, and all the data that will be collected, analyzed, and stored.

Preparing Your Network for the Upcoming Trends of 2020 & Beyond continued...

The Revolution of Analytics and Machine Learning Has Begun

More enterprises are using analytics and machine learning to monitor, manage, predict, and prevent network failures. The number of large and medium-sized enterprises using machine learning will double in 2018 compared to 2017.[4]

Takeaways
Ensure your network is capable of handling the bandwidth needed for the future of analytics and machine learning.

Wireless Bandwidth Use Will Rise Dramatically Between 2020 and 2021

With 802.11ax, or Wi-Fi 6, expected to take over as the primary wireless standard within the next few years, networks need to prepare for a rapid increase in bandwidth. One estimate projects a fourfold increase in the average amount of throughput each person will use.[6]

The new Wi-Fi 6 is designed for high-density environments, such as public transportation, hotels, malls, stadiums, and other public venues. It will also be used to handle cloud solutions that include both on-location and virtual applications.

Takeaways
Anticipate heavy bandwidth needs within the next few years as content, customers, and businesses capitalize on new wireless capabilities.

Automation is Rapidly Taking Over Processes Once Performed by People

Most network operations are manually executed using the command line interface. This leads to human errors, which results in misconfigured network devices, security risks, and outages. Because of this, businesses are transitioning to automation services that will take complete this for them with fewer errors and time spent.

Nearly a quarter of all "infrastructure services will have autonomous, self-managing capabilities by 2021 to speed business outcomes and mitigate the risk of human error."[5]

Takeaways
Consider how you will handle a shift towards automating if/when someone higher up requests it

Edge Computing will be the New Norm

With the rapid growth of IoT devices and sensors, more of the computing work will be performed on the edge of a network. Ultimately, this will cut down on the amount of data networks will need to handle, reducing latency and the overall cost to run a network.

Takeaways
Identify and anticipate your expected network needs based on newer edge computing devices.

Preparing Your Network for the Upcoming Trends of 2020 & Beyond continued...

More Companies are Shifting Toward Cloud, Multi-Cloud, and Infrastructure as a Service (IaaS)

While prem, cloud and hybrid IT strategies are the mainstays of networking, more and more network administrators are turning to Infrastructure as a Service (Iaas) for IT resources, such as compute, storage, and networking.

IaaS is highly scalable and makes it easier to mix and match different technologies and services from different vendors, allowing network administrators to choose the cloud services and networking products they want.

Takeaways
Prepare your network for the growth of IoT and the potential cybercrime associated with it.

IoT Security and Management is Increasing in Complexity

Unlike Virtual Machines (VMs), containers can all use the same OS and run multiple applications using the same hardware. In fact, it's possible to run up to as many as eight containers on the same hardware that normally only handles one VM.

Because of how cost-efficient they are, more enterprises are implementing containers in their networks. In the past, containers have been used in virtual networks, but they're starting to make their way toward the edge computing space.

Takeaways
Ensure your network is prepared for the adoption of containers over virtual machines.

Part 3

The Step-by-Step Process for Your Network Refresh

We designed this network refresh process to help you more easily capitalize on opportunities, find innovative solutions based on your budget, and ultimately make the best possible decisions for your network.

With that said, here are the four steps in this process.

Step 1	The Deep Dive
Step 2	The Research
Step 3	The Plan
Step 4	The Refresh

Each step is broken down into subcategories to help you best prepare for your network refresh.

Let's begin.

Step 1

THE DEEP DIVE

Sometimes we talk to professionals who simply want to swap out a few outdated switches for new ones, update some IP cameras, install some new access points, and call it a day. It's essentially a patch. Others need to take approximately 10% to 40% of their oldest hardware and update it with the most appropriate replacements. Depending on the size of the organization, that could mean anywhere between 5 and 500 switches. It's a big undertaking and a large part of why it's so important to make the right decisions along the way.

No matter what, your network refresh should serve your current, short-term, and long-term needs. Think about what they will be over the next several years as you answer the following questions.

- Are you expecting your IT staff to increase or decrease?

- Will your network need more bandwidth to support more traffic?

- Is your business expanding? If so, how and where? Into a new building? A new region?

- Will you need more storage or be able to access it faster?

- Will your network need to support mobile technology and/or remote workers?

- Will you be implementing a BYOD program or do you expect a current one to grow?

- What security and compliance demands are you currently supporting?

- What future changes and requirements do you anticipate?

With those answers in mind, continue with the rest of Step 1.

Create an Inventory of Your Network

Before you can identify the gaps in your network, you need to have a good idea of what you already have. Record the number of servers you operate and note the following for each:

- **Name, manufacturer, model and its type, such as physical or virtual**
- **Operating system, and security and warranty status**
- **Processor type and number of cores**
- **Amount of memory and storage, in gigabytes, including physical servers, on the network, or local**
- **Location**
- **Applications running on the server (version and number of users), including:**
- **Average utilization**
- **Storage utilization trends**
- **Network utilization trends**

Create a List of Your Software

Whether it was created in-house or purchased, make a list of all of your software. Include any software used for databases, CRMs, accounting, sales, marketing, and any other solutions you support.

Categorize Your Infrastructure

It's important to have a high-level view of your network before you can dive into the finer details. Organize your equipment into categories based on similarities.

There's no right way to group them, but you should focus on groups that help you plan your refresh. For example, you could place switches that are older than four-to-five years in one group, switches that specifically support IP cameras in another, and products with expired warranties in another.

If you find there's overlap, use Venn diagrams to highlight equipment placed in multiple groups. You can also use this as a resource when presenting your proposal.

Create a Networking Infrastructure Map

If you already have a diagram of your network and its infrastructure, use this step to update it if needed. It not, create a new one to use for this and future network refreshes.

Breakdown Your Costs

Your existing network will become less efficient and more costly to maintain as it ages. To help plan your refresh, determine how much it currently costs to maintain it. You can guess if you need to, but try to use a number that's as close as possible. Search through the trends over the last year to give yourself a better estimate if it helps.

Make sure to include the following costs:

- **Software licenses**

- **Energy use/consumption**

- **Support and maintenance services**

- **Colocation costs (if applicable)**

- **Staff training**

Step 2

THE RESEARCH

Using the information you gathered during Step 1, you can now identify the potential solutions and vendors that can help you meet your business goals.

Use the Gaps in Your Infrastructure as You Compare Vendors You already know what you need to upgrade and replace, but what are you missing? Identify the gaps in your network by assessing what you need to meet your goals. Use them to guide your search for vendors and solutions.

While you're researching and/or contacting vendors, ask about what else they provide. Many vendors provide packaged deals that include extra services such as custom-designed solutions, installation, customer service, extended warranties, support, troubleshooting, and more.

FOCUS ON POTENTIAL PROBLEMS WITH:

- Power loads
- Operating systems
- Databases
- Surveillance cameras
- Storage
- Anything else you're concerned about

Upgrading one server or switch may require increasing power or updating operating systems. Adding cameras may require more bandwidth or storage.

D-Link offers high-performance switches that often easily integrate into infrastructures with a mix of products you already have installed, and we'll work with you to design custom solutions.

Identify How You'll Host Your Applications

Where you host your applications (physical, virtual, or cloud server) affects the rest of your network, including the solutions you need, its performance, and its total cost. Ask your vendor about how potential solutions will affect all of these.

Determine Which Applications Should Be Upgraded

As you talk about your applications with vendors, determine which ones you'll need to upgrade and whether or not that will affect the solutions you'll need to host them. Start looking at applications that have expired warranties and move on from there. If you do need to upgrade, ask about the hardware you'll need to support them.

Determine Which Hardware Components You Want to Keep, Upgrade, or Buy

Newer applications and software usually require more performance, and your older servers might not be able to provide the performance they need. That doesn't mean you need to ditch them. It only means you need to determine what you need to support your software and business goals.

This step is also good for further supporting your reasoning behind the solutions you've chosen and backs the importance of their performance, scalability, energy efficiency, and security.

Evaluate Your Staff Training Requirements

Adding new tech means training people how to use it. Assess your team's knowledge and skill level with each new application and solution you add. Use that information to ask your vendor about available training materials. Make sure to ask about who can provide training, how much it will cost, and the best time to schedule it.

Step 3

THE PLAN

Now that you know what you need, it's time to plan your network refresh. This includes checking your numbers and scheduling the time needed. You'll want to consider your site, applications, storage, infrastructure, business needs, staff, and other requirements throughout this process. A few things to plan for include:

- The best time to start

- Downtime

- Delays, interruptions, and unexpected problems

- Contingency plans for problems and any additional time required

- Anything else that could interfere with your implementation (e.g. holidays, PTO, weather)

Evaluate Your Site's Ability To Host New Hardware

Before you remove old hardware or upgrade to new hardware, consider the limitations and requirements of your physical site. Make note of the electrical outlets you have available and might need, plus any power and cooling requirements.

Assign and Reassign Applications and Hardware

Pair your new and older applications with the hardware that can handle the requirements for each. Reassign old servers and switches for testing or development, if you want.

Create a Network Architecture Requirements List

Take a look at your network architecture requirements and jot down the following details, when applicable:

- Virtual Private Network (VPN) creation
- Router and/or server assignments
- 1GB and 10GB network upgrades
- Existing and needed Cat 6 cable upgrades
- Locations and lengths of wires

Calculate Your Storage Requirements

Consider your storage solution needs, including:

- Server assignments and all separate hardware needed
- Backup storage hardware
- Data growth rates
- Solid State Drive (SSD) upgrades

Determine Your Network's Capability

Compare your proposed network to your business requirements and determine whether or not it can support your needs now, next year, and three years down the road. Make sure to factor in your expected business growth.

Create a Project Plan Timeline with Projected Costs

Map out a timeline of everything that needs to be completed during your network refresh. Plan for each step, including the order, projected dates and durations, and how much everything will cost. As with the other steps, create contingency plans for unexpected problems and potential risks.

Step 4

THE REFRESH

With everything else set, it's time to refresh your network. This includes training your staff, notifying everyone affected by the changes, configuring the products, testing them, and deployment. Once you finish, it's time to start planning your next upgrade.

Make sure you have a clear plan and process in place before starting, and make sure everyone understands their role and responsibilities. The clearer the instructions, the smoother the everything should go.

Configure Your New Hardware

When you buy packaged solutions, your server configuration is often completed for you. If not, your vendor or IT team should be able to take care of everything for you.

Install Your New Operating Systems and Applications Before you make any changes, inform everyone who will be affected so they can prepare for any downtime.

Test The Functionality

Choose a few people or a large group for an initial test. You can make the testing period as long or short as you need to ensure everything is working properly.

Create a Clear Backup and Disaster Recovery Plan

Do not overlook this step! Make sure your network and infrastructure are prepared for any potential problems, including natural disasters. Set up backup and disaster

recovery solutions and include a clear action plan to address each risk.

Test User Acceptance

As you test everything, remain attentive to user comments and feedback. Use their comments to make adjustments as necessary. Again, the length of the testing period is up to you.

Train Your Staff

Schedule a time to provide the appropriate training for every member on your staff. Ensure they have a strong grasp of any new applications and products.

Release It

You've planned, implemented, installed, tested, and configured as much of your network as possible. It's time to release it.

Plan For Your Next Upgrade Cycle

Keep the materials you created from this checklist someplace safe and organized for your next refresh. Use them to note any updates to your network and equipment, plus any licenses and warranties that either expired or you purchased/renewed. Update your networking maps, infrastructure, and any training materials as needed or when you have time. All of this will help simplify your next cycle refresh.
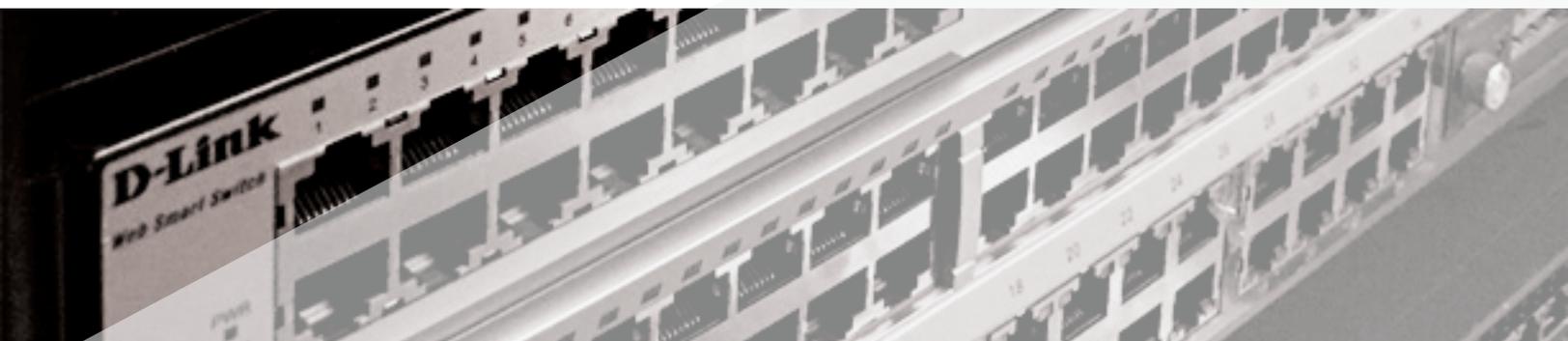
Part 4

D-Link Can Help You With Your Network Refresh

Now that you've made it through the guide, we're here to help. As we said before, we've helped thousands of professionals like you build, refresh, upgrade, and expand their networks. That includes custom-designed solutions, too.

Even if you're still not sure where you want to start, or you just want to ask some questions, give us a call or send us an email.

INDUSTRY EXPERTS

Businesses, schools, governments, hospitals, hotels, and more around the world have relied on our products for more than 30 years.

CUSTOM-DESIGNED SOLUTIONS

With the help of this list, you know exactly what you need. We'll work with you to help you check off every box.

TOP BRAND QUALITY. FAIR MARKET PRICE.

Our industry experts know the perfect parts for every product we make, maintaining quality and adding performance without the inflated prices.

LIFETIME WARRANTIES

Your business plans last for more than a few years. So should the warranties on the products that power it.

END-TO-END U.S. SUPPORT

Once you buy it, we support it. For free.

What Others Say About D-Link

"I don't know that every company would have done what D-Link did to proactively step in, pick up the ball and make sure that our network was completed quickly and fully functional. Today, we still count on D-Link when we're in a pinch. I've been very pleased with the support we've received from D-Link—as well as their commitment to improving school environments."   —*Dodgeland School District*

"Today, the system is running great and I haven't had to even touch it in 18 months. It's 95% maintenance-free and I don't have to worry about it at all. From a technical director's standpoint, it's absolutely perfect." —*Kingston Public School*

"We have built a diverse, reliable network...on D-Link components. They were the only ones we could find that had the right feature set at a cost we could afford." —*Grundy County*

"We rely on D-Link product engineers to help us define availability and fair value for solutions that aren't even out yet. This is more complicated than you think because over time new switches come out, product names change and other products devolve or don't exist anymore. Having the flexibility to talk to product engineers to discuss how to deliver next-generation solutions is one of the best things about working with D-Link." —*Pavlov Media*

Trusted by Industry Leaders

Ready to refresh? Let's chat!
Phone: 888.331.8686
email: solutions@dlink.com

References

1. Boulton C. 'Digital laggards' must harness data or get left behind [Internet]. CIO. CIO; 2016 [cited 2018Nov6]. Available from: https://www.cio.com/article/3122806/it-industry/digital-laggards-must-harness-data-or-get-left-behind.html

2. Ventures C. Cybercrime damages are predicted to cost the world $6 trillion annually by 2021 [Internet]. PR Newswire: press release distribution, targeting, monitoring and marketing. 2017 [cited 2018Nov6]. Available from: https://www.prnewswire.com/news-releases/cybercrime-damages-are-predicted-to-cost-the-world-6-trillion-annually-by-2021-300540158.html

3. City pays $2,000 in computer ransomware attack [Internet]. AP NEWS. Associated Press; 2018 [cited 2018Nov6]. Available from: https://apnews.com/49c15737cbfa4627be170a9e5fcb7c3e

4. Technology, Media and Telecommunications Predictions 2018 | Deloitte China | TMT Industry [Internet]. Deloitte China. 2018 [cited 2018Nov6]. Available from: https://www2.deloitte.com/cn/en/pages/technology-media-and-telecommunications/articles/tmt-predictions-2018.html

5. 6 Hot Tech Trends That Will Impact the Enterprise in 2018 [Internet]. Network Computing. 2018 [cited 2018Nov6]. Available from: https://www.networkcomputing.com/data-centers/6-hot-tech-trends-will-impact-enterprise-2018/755072649

6. Weinberg, Neal. "What Is 802.11ax Wi-Fi, and What Will It Mean for 802.11ac." Network World, Network World, 27 Feb. 2018, www.networkworld.com/article/3258807/lan-wan/what-is-802-11ax-wi-fi-and-what-will-it-mean-for-802-11ac.html.