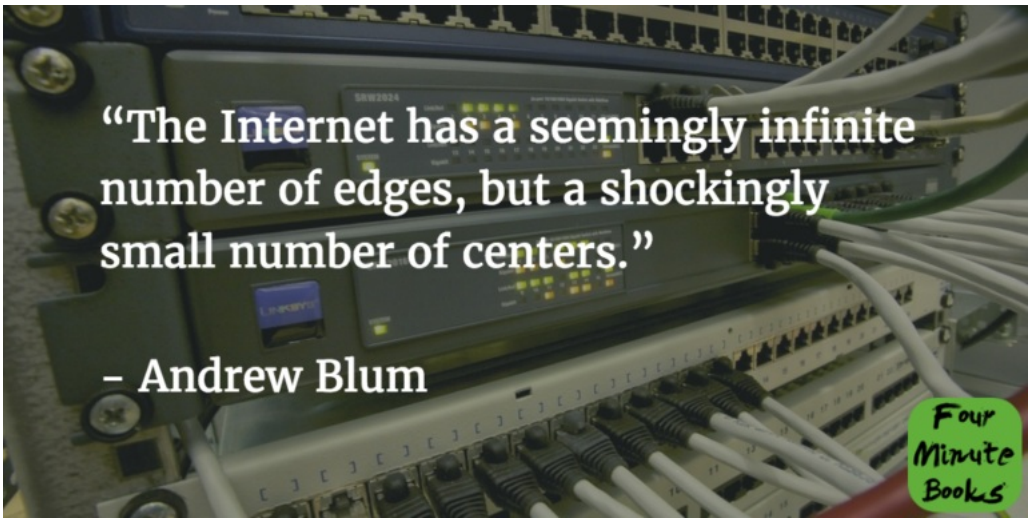
Tubes Summary

fourminutebooks.com/tubes-summary

1-Sentence-Summary: *Tubes is a behind-the-scenes look at the real, tangible, physical heart of the internet, this elusive and seemingly invisible technology that permeates all of our lives on a daily basis.*

Read in: 4 minutes

Favorite quote from the author:



The internet has become a big place. Over 1 billion websites are live right now, every day over 100 billion (!) emails are sent and this blog post will be one of 3 million published in this 24-hour period. If you're reading this blog on a regular basis, chances are the internet is a self-evident, natural part of your life. But it's still not for everyone.

As of writing this, there are about 3.5 billion internet users worldwide, meaning that **half of the world's population is not online yet**. Can you imagine how big things will get as we slowly connect everyone to the web? Facebook has already dedicated itself to this mission.

While the sheer size of the internet is enough to make your head spin, there might be one thing that's an even bigger mystery. Where is the internet? Like, physically. Do you know the answer?

I didn't. Sure, cables, servers, but where? And how they're connected? No idea. Until now. Thanks to *Tubes* by Andrew Blum, light is brought to the darkness of the internet's physical structure.

Here are 3 lessons I learned from the summary on Blinkist:

1. The internet is actually a network of networks – the more the better!
2. Hubs, where companies peer with one another, are what keeps the internet fast.
3. Underwater cables connect the big hubs, while data storage centers keep all of the information we create online.

Curious to understand the physical nature of the world's most powerful technology? Let's take a closer look!

Lesson 1: The internet isn't just one network, it's a network of networks.

We've obviously come a long way since the very humble beginnings of the internet in the 1960s (then called ARPANET), ever since it's grown exponentially. You'd think that with so many networks and participants added every day, the internet would become a messier and messier place – but in reality, it just gets better.

The biggest participants of the internet are networks themselves, like or . **The more inter-connected these networks are, the faster and more efficiently you can travel from one to the other**. If you click on a link on Google that directs you to Facebook, and the two are directly connected, it takes less time for your connection to load the page.

Physically, these connections happen at hubs, so-called internet exchange points, which are really just places filled with tons of routers from different companies, that are connected to each other and all to one main line, which then connects via fiber tube to the next IXP, condensing the web even further.

Lesson 2: Big companies and major networks peer with one another at big hubs, which is what makes some websites faster than others.

The practice of directly connecting one big network to another at a hub is called peering. **It's nothing more than plugging a cable from one router to another,** allowing the data packages to travel shorter distances and thus reach their destinations faster.

Obviously, the more companies you peer with, the better the access to your network. Facebook, for example, peers with so many other networks that it's sometimes jokingly called a "peering slut." That's why no matter where you access Facebook from, it loads really fast in most instances.

However, as good as peering is while it works, sometimes companies disagree and literally decide to pull the plug. This always leads to fallout and connectivity problems. For example, when Sprint and Cogent broke their connection in 2008, the US Department of Justice, NASA and all New York Courts couldn't send emails for three days straight, not to mention the big outage for many private users.

Lesson 3: Everything you create online is stored in data centers, which are connected with underwater cables and hubs.

Apart from IXPs, two other physical components are majorly responsible for keeping the internet up and running:

1. **Data storage centers.**
2. **Underwater cables.**

60 million pictures a day are uploaded to Instagram, 350 million photos to Facebook, over 500 million tweets sent – where does all this stuff go?

The cloud, they keep telling us, but do you see bits of text floating in the sky? Of course not. Storing something in the cloud simply means that it's not physically stored on your laptop (which is why you don't need as big of a hard drive any more), but transferred to a big data storage center, somewhere in the world, via the internet, and stored there. These data centers are huge, highly secured and often shrouded in mystery, because they contain so much sensitive data.

The last part of the internet equation are the submarine communication cables, which are made of optical fiber and connect the big hubs and data centers across seas and even oceans. These are also very sensitive to natural disasters, like when a 7.0 magnitude earthquake off the coast of Taiwan killed internet access for most of South Asia, China and Hong Kong for several days in 2006.

Tubes Review

Tubes not only sheds some much needed light on how one of the most standard and taken-for-granted technologies of today works, it also lets you appreciate the internet much more. If anything, this is a great reminder to not freak out if your phone takes a few seconds longer to load something or when your wifi at home doesn't work for a couple hours. Very informative and a good way to close a gap in general education!

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What else can you learn from the blinks?

- How information is transformed physically while traveling through the web
- Where the biggest hubs are
- How many users the internet had in its early days
- What technological change made it possible for the web to grow exponentially
- How many big networks there are
- Who runs the internet
- When the first submarine cables were used

Who would I recommend the Tubes summary to?

The 16 year old, who doesn't know what the picture of a receiver on her smartphone's phone

app really stands for, the 37 year old freelance web designer, who makes his living online, but doesn’t know much about its physical structure, and anyone who recently yelled at their screen because their wifi was down.