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Homeland Security & Cybersecurity

Cybersecurity Demise

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Lesson 42
Cybersecurity Demise

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In this lesson we ask the question "Does cybersecurity necessarily need to be a homeland security problem?"

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The answer is "no".

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Just as we cannot stop cyber attack, we cannot stop earthquakes.

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- Until recently, a magnitude 6 earthquake was the source of major catastrophe.
- With the **implementation of stringent seismic standards in building codes**, magnitude 6 earthquakes are not nearly the problem they once were in California.

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We cannot stop earthquakes, but we can mitigate their effects.

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Similarly, we may not be able to stop cyber attack, but we may be able to mitigate their effects when it comes to critical infrastructure.

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Let us see how we might mitigate the effects of cyber attack against the four lifeline infrastructure studied earlier.

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Drinking Water

- The worst case scenario would be depriving a medium to large size city of any water.
- This would be worse than the situation in Flint Michigan which still has water, it's just not drinkable.
- Still, it is available for washing, sanitation, and most importantly firefighting.
- **In a worst case scenario, there would be no water for even these purposes.**

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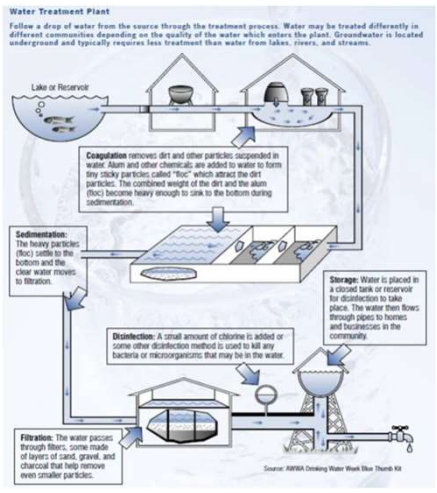
- A cyber attack could conceivably bring about such conditions by causing strategic pumps and tanks to self-destruct.
- **Such mechanical failures, however, could be quickly repaired, probably in as little as 72-hours given requisite priority.**
- **So while the disruption would be significant, it could also be short lived and survivable.**



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Swift and effective response actions could mitigate the worst case consequences of a coordinated attack on the drinking water infrastructure.

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Aviation Infrastructure

- A worst case scenario in this respect would be the introduction of a **virus that disables the avionics suite of a number of aircraft or causes them to deliberately crash.**
- **The inherent problem with heavier-than-air aircraft is they tend to fall from the sky when things go wrong.**
- **Surface vehicles don't suffer from this vulnerability.**

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The obvious answer is not to take to the sky for travel.

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- For many reasons this is not practical today, but that does not mean it won't become so.
- **The expansion of high-speed rail service and the introduction of self-driving vehicles could significantly transform the future of mass transportation.**
- **Ironically, air travel today is significantly safer than ground travel;** the odds of dying in a plane crash are one in 11 million, whereas the odds of dying in a car crash are one in 5,000.

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Revolutionary changes in ground transportation could eliminate the fundamental risk of air travel.

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Electricity Infrastructure

- As was stated in Lesson 14, the worst case scenario is **shutting down a significant portion of the grid for an extended period of time, months if not years.**
- The reason the 2003 blackout didn't last longer was that no generators were destroyed.

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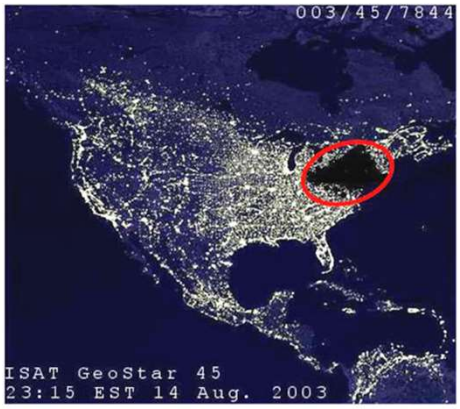
- Again, **destroy the generators**, and we're talking a much longer recovery period because
  - **Few spares** are kept in stock, and
  - **They're no longer manufactured in the US.**
- Can this situation be fixed?



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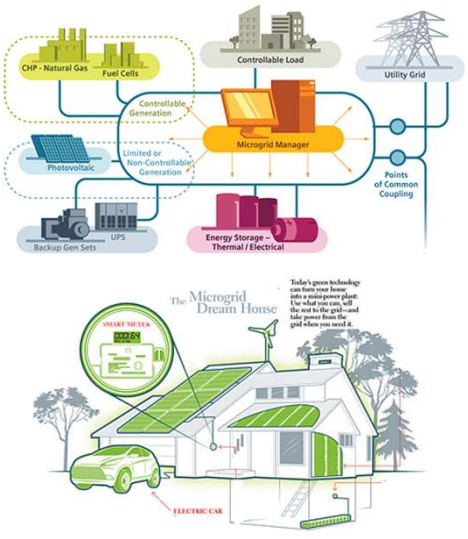
- One answer is **segmentation**: subdivide the big grids into smaller ones.
- The idea is to stop little outages from becoming big outages, such as the 2003 northeast blackout, by halting their spread.
- **The concept is called "microgrids" and it's currently under development.**



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By changing the grid topology, it might be possible to localize outages, eliminating the threat from large-scale cyber attack.

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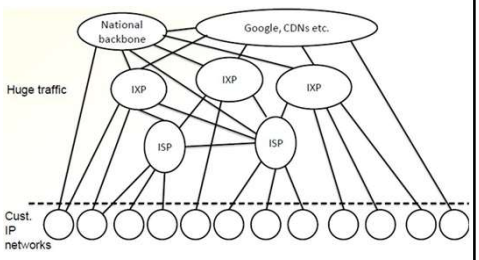
Internet Infrastructure

- Can the Internet be made immune to cyber attack?
- **Not much more than it is today.**



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- However, the beauty of the Internet is that it has **built-in redundancy** designed to withstand deliberate attack.
- So even if the worst case scenario could bring down all the root domain name servers, it would **probably be only a temporary disruption**, as the system is designed to self-repair and quickly restore normal services.

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Built-in redundancy and self-repair capabilities make it unlikely the Internet will experience regional outages for more than a short period.

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While we cannot stop cyber attack, we can mitigate the effects to infrastructure such that they no longer pose a catastrophic threat.

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Through the normal course of maintaining and upgrading the nation's critical infrastructure, and by whatever technological breakthroughs that may happen, it can gradually be made less vulnerable to cyber attack.

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And while cybersecurity will remain a problem for the foreseeable future, it need not remain a problem for homeland security.

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Conclusion

Questions?

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