

# Further Reading

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## Preface

This is very much a work in progress and suggestions/feedback are appreciated. You can use this [signup link](#) to get mail about updates or send feedback. Just use the [RSS](#) feed since I never did implement the email system.

You can also see my posts on [CircleID](#) [CircleID](#).

## Classic Essays

These are essays and writings that have endured over the years.

- [Beyond Limits](#). I wrote this in 1996 as a chapter in the [ACM](#) book [Beyond Calculation](#). In this chapter I explain that Moore's law is about particular market configurations and is not particular to semiconductors. More to the point you lose the power of hypergrowth when you tie it to a singular measure of success.

- [Rush Hour 1997](#). I wrote this in 1989 projecting a future of mobile connectivity. The date of 1997 was meant to be the far future. We're still not quite there.

## My writings on ~~Connectivity~~ Opportunity

- [The Internet and my 53 Years Online](#). The Internet isn't just a continuation of telecom but a fundamentally new concept.
- [Neutrality to Opportunity](#). Shifting the conversation from focusing on the network to the larger issue of opportunity.
- [Frequently Asked Questions](#) about the Internet as Infrastructure.
- [Purpose Vs Discovery](#). I go into more detail about the counter-intuitive concept of how we get abundance by creating opportunity rather than presuming we are building solutions for well-defined problems.
- [From Broadband to Infrastructure](#). Looking beyond network neutrality.
- [Infrastructure for a Connected World](#). We need a **free-to-use** infrastructure so we aren't limited by rent-seeking intermediaries as we do now.
- [5G and ATSC Vs. The Internet](#). ([See column below](#))
- [Restructuring Consumer Electronics](#). This was my first column for the IEEE. In it I give a simplified view of how the Internet happened within the context of the pragmatic world of consumer electronics. I go into more of the issues in other columns.
- [Internet Native Policies](#). How the Internet is different from telecommunications and why "best efforts" means we can start with local efforts rather than relying on providers.
- [Connectivity Policy](#). This is the more detailed policy document that explains how the Internet is really about creating solutions which take advantage of the nature of software to redefine the world. I submitted it to the FCC as part of its inquiry on neutrality policy.
- [What infrastructure is needed for positively disruptive technology](#) A talk I gave to ISOC in which I explain how the Internet is a departure from traditional telecommunications.
- [The Internet: Missing the Light](#). By assuming connectivity is expensive we find ourselves justify connectivity with heavy duty products and big

data rather than enabling the mundane applications that allow us to discover the future.

- [Zero Rating](#). The problem of applying telecommunications policies to the Internet.
- [Engineer's Dilemma](#). This is a work-in-progress and more a place holder until I do a formal version.
- [Spectrum as Farmland](#). Our current policies treat spectrum as if it were a physical thing like farmland. In fact, it is just a construct from the 1920's that limits our ability to communicate.

## Talks

- [TEDx – The Internet and Abundance](#). November 2016. I trace my own history of learning about connectivity as a way to understanding how creating our own solutions leads the way to abundance.
- [Beyond Neutrality](#). October 2014. A talk I gave on the themes in this essay. Some might prefer a video.
- [Thinking Outside](#). January 2014. The evolution of digital connectivity and how the Internet is a discontinuity from the traditional of telecommunications.
- [A Software-\(re\)Defined World](#). June 2015. My talk at ICCE in Taiwan about how the Internet is a byproduct of the way we use software to create our own solutions.
- [Keynote ICCE 2015 Taiwan](#). The Internet and other consequences of software redefining our world.

## IEEE/CE Columns

This is a list of the columns I've written for the [IEEE Consumer Electronics Societies](#) magazine.

### 2023

- [Trust and Insecurity](#). We need to be wary about perimeter security and firewalls. While they seem to provide protection, they are vulnerable to the slightest breach. More problematic is that they prevent unanticipated innovation and make it difficult to try out new ideas. You can't know all the second-guessers in the path.

### 2022

The column has resumed.

- [Distributed Cooperation](#). I use my home as a living laboratory for connected systems. One of the goals is to avoid single points of failure by having direct relationship between endpoints.
- [The Public Packet Infrastructure](#). The Internet isn't just a way to access the web, it is fundamental infrastructure -- the Public Packet Infrastructure.

The infrastructure has seemingly unlimited capacity because we can innovate and take advantage of opportunities instead of negotiating for passage. We need to bring public policy and public perception into alignment with this new reality.

Note that the columns are also reachable as

<https://rmf.vc/IEEECEyyyyymm>. Where the months are 01, 04, 07, 10 as per the current publishing cycle through 2017. The cycle changed to bimonthly<sup>i</sup> (every two months) in 2018 – 01, 03, 05, 07, 09, 11.

### 2021

- [Empowering People ... and Their Things](#). When we read about smart cities each new project is treated as a separate investment that has to deal with all the complexities of connectivity on its one. By recognizing the power of the Internet as a common infrastructure we greatly simplify and reduce the cost of such project and we empower individuals to innovate. [The Public Packet Infrastructure](#) is an implementation of this concept.
- [The Age of Software: An Introduction](#). The combination of digital representation and software has transformed the world and our understanding of the world. The Internet as just one byproduct of this fundamental conceptual shift from meaning being intrinsic to meaning being defined by software with multiple interpretations co-existing
- [Living the Beta Life](#). It feels like all the devices and software I use are in beta, waiting for me to find bugs. I'd have it no other way -- I don't need to predict the future if I can live it. Alas, products are still in beta even if they are official shipping because I go beyond the typical use case and don't handwave away failures that I know are not necessary.
- [Connectivity Starts at Home](#). Today's Internet is just one application of the powerful idea of best-efforts connectivity. The home router (NAT) decouples the connectivity within the home from the larger internet enabling innovation that leverages the Internet without being limited by it.
- [5G Vs Consumer Technology](#). 5G is often heralded as the future of communications technology. It's actually the antithesis. It is the anti-Internet clawing intelligence back into the network and limiting innovation. With 5G consumers would once again be limited to a choice of offerings and a new generation would rediscover the busy signal.
- [TV is Over – Long Live Content](#). We are now in the age of "content" with Television (and movies) now available for view online just like books rather than being experiences you had to tune into

on a broadcaster's schedule. We haven't cut the cord, we just forgot about it and moved on.

## 2020

- [The JavaScript Eco system](#). JavaScript started out as a simple extension for the browser but has become so much more. In part this is true on building on rich concepts going back to Lisp. Along the way it has challenged the givens of programming and given us a high-performance flexible language along with rich libraries and rich tools. We're just beginning to discover the possibilities.
- [Beyond the Interweb](#). Today's Internet is the product of a grand vision of how people can collaborate and communicate.
- [Relationships among Devices](#). We need to think outside each device and understand the relationships between and among the devices.
- [Rewiring my House ... and the World](#). Using software-based relationships instead of physical wires gives insight in the parallels between connectivity within my house and connectivity across the wider Internet.
- [Communities of Things](#). We tend to think of security in terms of relationships between two end points or devices on the same physical network. We need to think more abstractly about communities as the units of trust and cooperation.
- [What I Want for CES](#). CES is a time to see new products and services. Alas, my expectations might be too high.

## 2019

- [Connecting](#). In 1986 I wrote a story for the Boston Computer Society predicting a connected future by 1997. Alas, it's 2019 and that future is still pending.
- [Bits VS. Things](#). Software concepts in the physical world. I use the example of transporting a truck by rebinding identifiers.
- [As A Service](#). The problem with depend on the cloud and with depending upon intelligence in networks as with 5G.
- [Found Objects](#). How I use software to repurpose existing object as IoT.
- [Seeing the Light - Properties of 400-800 Terahertz Radios](#). The Blue LED and software have allowed us to see light in, well, a new light. As a way to paint surfaces and create moods and so much more.
- [From Hi-Fi to CLI](#). The classic command line is returning to prominence because allows for scripting and a stable interface. It's no longer a relic of the past but rather a path to the future.

## 2018

- [From Net Neutrality to Seizing Opportunity](#). We should be creating opportunity not just enumerated services.
- [Broadband to Infrastructure](#). Based on my earlier article in Broadband Breakfast.
- [Got API?](#) If your home control product doesn't have an open API, then it's a niche product and not part of the future of connected devices.
- [Assembly Required](#). We used to connect devices using belts and pulleys. Today those connections are done in software.

## 2017

- [Whither Consumer Electronics](#). What is the future of consumer electronics as we shift from creating purpose-built devices in software to generic hardware platforms defined by software?
- [5G and the Internet – The Internet Versus Telecom](#). (<https://rmf.vc/IEEE5GATSC>) 5G is positioned as the next generation of wireless telecommunications. The approach of solving problems in the net providers a useful contrast for understanding the Internet's approach of solving problems outside of networks.
- [Site Insites](#). This past summer I decided my website need to be refreshed. Rewriting the site from scratch in JavaScript (actually TypeScript) gave me a chance look beyond the façade of the web and better understand how the Web works.

## 2016

- [Mobile-Edge Computing Versus the Internet?](#) When we frame local computing as being at the edge of a network we lose the big ideas of connectivity by framing the Internet in terms of telecommunications. (October 2016)
- [The Stories of Software](#). We tend to think of programming as an exact engineering practice. A better way to think about software is that it's a way we write stories that can take on lives of their own. (July 2016)
- [80/20 Consumer Electronics](#) I learn by doing and creating my own solutions. This gives me a chance to experience the future and see beyond the present. Join me in exploring the possibilities. (April 2016)
- [A Hacker's Vacation](#). A relatively light piece about what I learned renting a Tesla and using technology as I traveled. (January 2016)

## 2015

- [The Internet is about Relationships](#). Rather than thinking in terms of wires need to think about the end points of relationships. (October 2015)
- [API First](#). The importance of having programmatic interfaces rather than just focusing on the user interface. (July 2015)
- [Deconstructing TV](#). (<http://rmf.vc/IEEEDeconstructingTV>) The business “Television” as we know it is very much tied to the accidental properties of 1930’s vintage technology. We need to re-think very part of the technology and the industry. (April 2015)
- [Putting it all Together?](#) Real life lessons in putting together those (potentially) connected things.

## 2014

- [Connected Things](#). Understanding the so-called Internet of Things. (October 2014)
- [\(Not\) Getting the Message Across](#). Why we need simple packet connectivity rather than smarter intermediaries. (July 2014)
- [HTML5](#) is become the new compute engine allowing us to start to take advantage of the capabilities in the devices around us. It’s not just about the web. (April 2014)
- [Life \(yet to be\) Scripted](#). The automation meme assumes machines will do what we want them to do not what we tell them to do. (January 2014)

## 2013

- [Deconstructing “the Smartphone”](#). Today’s smart phones may be more useful as building blocks than as devices in their own right. If only we could make their potential available. (October 2013)
- [The Internet of Things versus the Access Framing](#). Putting a border around The Internet prevents us from building connected devices. (July 2013)
- home control. (April 2013)[Refactoring Consumer Electronics](#). How the Internet is part of a larger

trend that challenges the traditional framing of consumer electronics now that value is created in software rather than just hardware. (January 2013)

- [\(Not\) In Control of your Home](#). The challenges of

## Legacy Works

These aren’t necessarily classics but do reflect my thinking and writing from days of yore.

- [Operating systems: A relic of the past](#). (<https://rmf.vc/OSRelic>) A paper I presented at a workshop on operating systems in 1995 rethinking classic concept of an operating system (such as Windows or Unix)

## Facebook Posts

[Facebook posts](#). These are mostly mulls and works-in-progress.

## Additional Readings

To understand the design point of the Internet you can read the [End-to-End Arguments in System Design](#) paper. For those who won’t past the title the term “end to end” is used in the sense of only depending on the end points and not anything between.

[Railroaded](#) by Richard White. The comparisons between the history of railroad regulation and Telecommunications are striking.

It’s also interesting to read about the history of [turnpikes](#) and how we moved from toll roads to public highways in the early 20<sup>th</sup> century.

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<sup>i</sup> <http://www.getitwriteonline.com/archive/051401bisemi.htm>