Very Rough Draft
Welcome to the RINAssiance!
A TGI Module
Trinity College Dublin
June 8-12, 2015

Abstract

There is no doubt that Internet has been a wild economic success, world-changing, something the world economy has come to rely on. In that regard, it may be the most significant development of the 20thC, equivalent to the Industrial Revolution. However, by 1982, it was already deeply flawed and by the end of the 80s irreparably so. If the Internet were an Operating System, it would have much in common with DOS. This wouldn't be so bad if this were a case of "if we just knew then what we know now" but it is a case of "We knew then what we know now." At least we knew most of it and the rest logically followed. As science and engineering, the Internet is a tribute to how long Moore's Law can keep such flaws at bay. Flaws that even now are costing the economy billions and its increasing fragility is becoming more dangerous.

Will it one day collapse under its own weight? (The question journalists love to ask.) Unlikely, it is more likely to be a whimper than a bang.

But there is a new way. A way that goes back to the beginning and picks up the threads of insight that were lost and carries them forward with very surprising results.

This module is three modules in one. We will look at how we got into this mess. How socio-political and economic forces combined to take the development of networking out of its normal track, a significant object lesson for future efforts. The lessons of the autocratic development of the Internet vs the democratic approaches elsewhere have many lessons.

Intertwined with the historical perspective, we will explore the fundamental principles of networking with some surprising implications. In essence, deriving it from communication within a single computer. We will discover: that the three-way handshake in TCP has nothing to do with creating synchronization for reliable data transfer; that naming a host is irrelevant to network addressing; that router table size can be reduced by 50% - 75% with a similar reduction in complexity at no cost; that mobility can be accommodated with no additional protocols and no need for concepts of home or foreign router or even any tunnels; that VLANs and WiFi are basically the same thing; that congestion control is in the worst possible place, and essentially makes QoS impossible and there is no fix; and perhaps most surprising, that a global address space is unnecessary. IOW, IPv6 has been a complete waste of time.

And afternoons, we will also get our hands dirty with exercises with the RINA simulator and a demo of RINA and its Network Management.

Recommended Reading:
Day, John. **Patterns in Network Architecture: A Return to Fundamentals**, Prentice-Hall, 2008. (PNA)
Handouts at the class.

Syllabus:

Monday

9:00 am Registration

Morning: What Went Wrong? A first look at how we got here.
Networking is IPC and only IPC – Learning the basics we all know
Welcome to the RINAssiance – Part 1 of How IPC along with a couple of other concepts answers all our questions.

Reading: PNA: Preface, Chapter 6,

Tuesday

Morning: What We Have Learned About Data Transfer Protocols; Synchronization for Reliable Transfer Considered More Closely

Readings: PNA: Chapter 2, 3.
RINA Specifications Handbook: Data Transfer Service Definition, EFCP Specification, RMT Task Specification, Specification Template for a DIF SDU Protection Module.
Timer-Based Mechanisms for Reliable Transport Protocol Connection Management, R.W. Watson

Afternoon: Session 1 with the RINA Simulator

Wednesday

Morning: What We Can Learn from Mrs McCave – How Naming and Addressing Got to be a Mess
Principles of Naming and Addressing
Readings: PNA: Chapter 5 and for the ambitious (Chapter 8)
Why Loc/Id Split Isn't the Answer by John Day
RINA Reference Model Part 1; Part 3-1.

Afternoon: Session 2 with the RINA Simulator

Thursday:

Morning: Stalking the Upper Layers
DAFs/DIFs and All That
RINA Management

Readings: PNA Chapter 4; RINA Reference Model, Parts 1 and 2.

Afternoon: RINA Demo

Friday

Morning:	Shortening the Dark Ages of Networking: What Would Hari Seldon Do? Thoughts on What to do Next
Readings:	The Foundation Trilogy by Issac Asimov The Trouble with Physics by Lee Smolin
Afternoon:	Who Brought the Beer?