Jon Postel: Good Taste
In Protocol Design

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Jon Postel

• AKA:
  – Assigned Numbers authority ("IANA") 1971-1988
  – Protocol Designer
  – Protocol Documentor
  – "Deputy Internet Architect"
  – "Internet Protocol Czar"
  – "Arbiter (Enforcer) of Good [protocol] Taste"
JBP as Protocol Designer

- There were many contributors to the development of the Internet protocols.
- Most contributors did one or a few things; Jon contributed in one role or another to nearly EVERY protocol.
- Jon could (and did!) immediately pinpoint the essential issue in any question about protocol design.
# Counting JBP RFCs & IENs

<table>
<thead>
<tr>
<th>Year</th>
<th>Tech RFC</th>
<th>Admin RFC*</th>
<th>IEN</th>
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<td>1970-1974</td>
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*RFC Ed, IANA functions*
JBP Protocol Designs

- **NCP (Arpanet Network Control Program)**
  - Major contributor, published results [rfc 48, 55, 55]
- **ICP (Arpanet Initial Connection Protocol)**
  - [rfc 145, 165] with SCrocker, others
- **Telnet Protocol**
  - Major contributor to V1 [rfc 318]; contributor to V2.
  - RCTE (Remote Controlled Transmission and Echoing Telnet option) -- With Dave Crocker [rfc 560, 726]
JBP Protocol Designs

- PCP (Procedure Call Protocol for NSW)
  - With Jim White, who later did Xerox Courier
- NSWB8
  - (strong data typing for NSW) [IEN ]
- UDP [rfc 768]
- ICMP [rfc 792]
- SMTP [rfc 788, 821]
Protocol Engineering

• In his documentor role, he described other's protocols in clear, concise, elegant prose.
  – Esp. IP, TCP, FTP
  – Often required detailed protocol engineering
• In his RFC Editor role, he tried to enforce wisdom and good taste, and he rejected poorly thought-out ideas.
A Note on Jon

• Danny Cohen wrote [rfc 2441, Nov 1998]
  – "Jon was an authority without bureaucracy. No silly rules! Jon's authority … was due to his personality, his dedication, deep understanding, and technical taste and style".
  – "Jon never joined the Powerpoint generation. Jon always believed that content was the only thing that matters. Hand written slides were good enough. Colors and logos were distractions...."
Robustness

• The most famous Jon Postel admonition: "Be liberal in what you accept, and conservative in what you send."

• Avoid regeneration—E.g., an error msg must not create an error msg
Economy of Design

• Jon (and other key players in the early days) were strongly reductionist –
  – Use simple, powerful mechanisms
  – No unnecessary complexity
  – Restraint: omit "nice ideas" that are not really important
  – I think of it as taking a Comp Sci viewpoint, not an engineering viewpoint.
More Economy…

• Don't standardize more than necessary
  – Minimum: for interoperability
  – Unspecified details:
    • Will be filled in by competent implementors (assumption!)
    • Will be determined by future experience
    • Can be added later when necessary for interoperability

• "Less is more"
  – Simpler protocol designs are more powerful
  – Better to under-specify than over-specify
More Economy…

• Protocol should include a field X only if you can figure out what a receiver can/will do with X.

• Don't be afraid to start over
  – Repeated "fixes" or added complexity in protocol are sign of flawed basic design; start over.
Path to the Future

- Avoid "flag days"
- Mechanisms for testing later versions during production of current version.
- Escape mechanisms for extending range of naming spaces
- "Spare" flag bits and values, for extensions
Summary

- Robustness Principle
- Clean and Simple
- What to standardize, and What not to.
- Less is More
- When to Start Over
- Path to the Future
Other Interesting JBP Efforts

- RFC 560: "Hereafter proposed protocols shall be submitted in the form of on-line documents…" Oct 73
- RFC 706: "On the Junkmail Problem" (at the network layer; introduced "denial of service". Nov 75
- RFC 925: "Multi-LAN Address Resolution" Oct 84
- RFC 1016 "Something a Host can do with Source Quench (SQuID)"