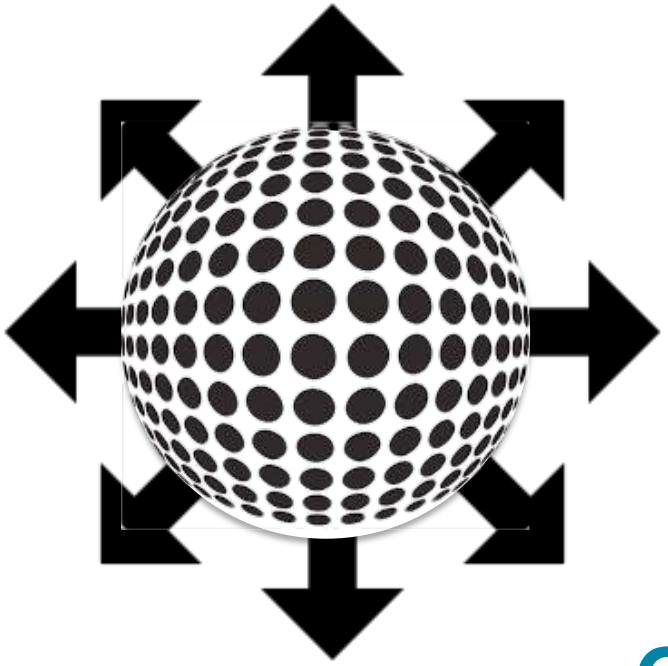
93rd IETF Prague
July 19 – 24, 2015



DDoS Open Threat Signaling (DOTS) Working Group

Operational Requirements

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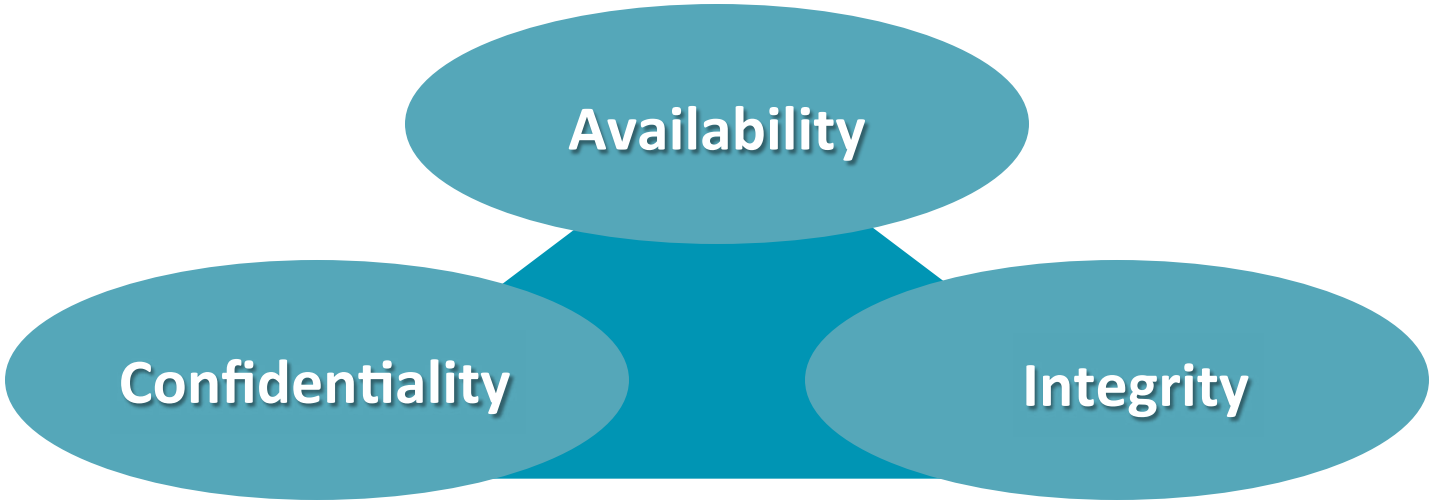
Introduction & Context

DDoS Background

What is a **D**istributed **D**enial **o**f **S**ervice (DDoS) attack?

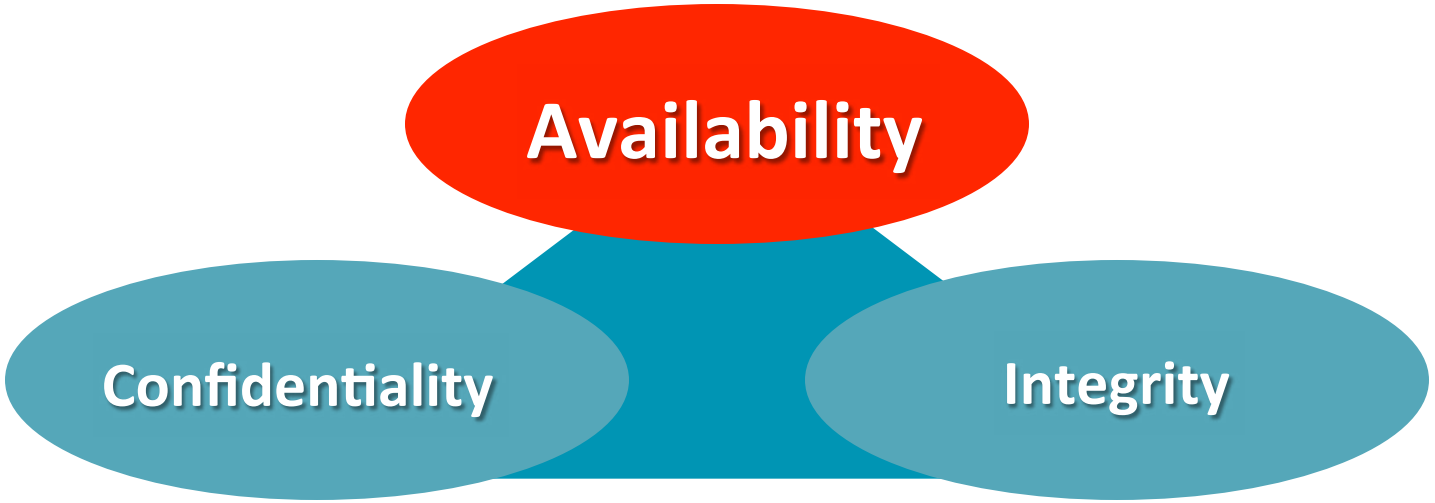
- An attempt to **consume** finite **resources**, **exploit weaknesses** in software design or implementation, or **exploit lack** of infrastructure **capacity**
- Targets the **availability** and **utility** of computing and network resources
- Attacks are almost always **distributed** for even more significant effect (i.e., DDoS)
- The **collateral damage** caused by an attack can be as bad, if not worse, than the attack itself
- **DDoS attacks affect availability**! No availability, no applications/services/data/Internet! No revenue!
- DDoS attacks are attacks **against capacity and/or state**!

Three Security Characteristics



- The goal of security is to maintain these three characteristics

Three Security Characteristics



- The primary goal of DDoS defense is maintaining availability in the face of attack

Realities of Coordinated DDoS Defense

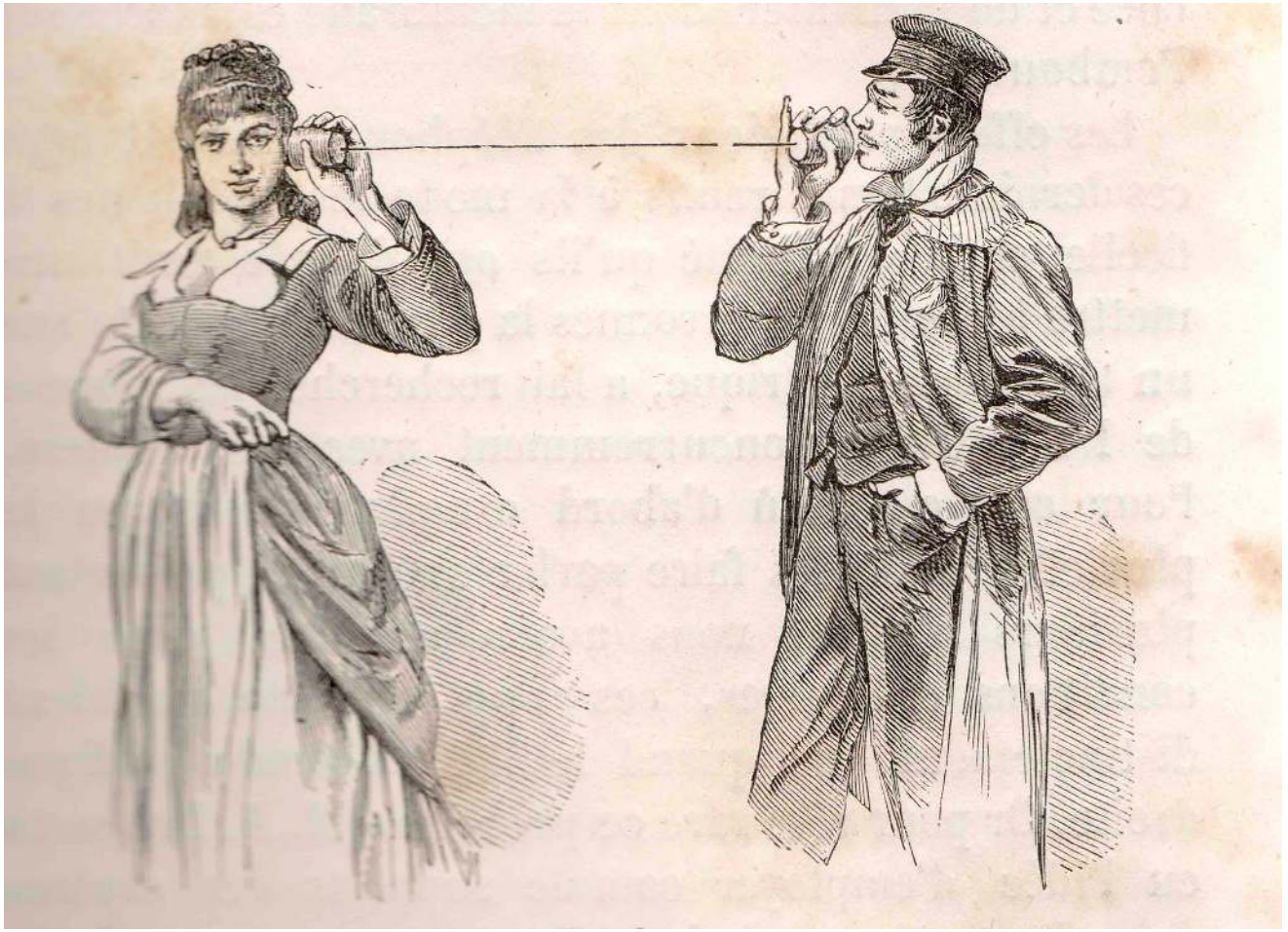
Common Perception of Internet Security Posture Today

Actual State of Internet Defenses Today

Who Can Help?

Your ISP or MSSP!

How Can You Ask for Help Today?



Technology pioneered by Robert Hooke in 1667, only slightly improved!

Asking for Help is Hard! Knowing How to Help is Harder!

- Most end-customers have no idea what their normal Internet traffic looks like, much less what's actually happening when they're being DDoSed (or even *understanding* that they're under attack!).
- Many ISPs/MSSPs do not provision DDoS defenses in detail for their end-customers. In many (most?) cases, end-customers cannot articulate what servers/services need protection, what network access policies should be in place, etc.
- This drastically slows reaction/mitigation times.
- This drastically impedes reaction/mitigation efficacy.
- This leads to extended outages, lost revenue, frustrated end-customers (and customers of those end-customers).

Automated DDoS Attack Notification Methods Exist Today

- But they are proprietary!
- End-customers can't mix-and-match vendors, ISP DDoS cloud mitigation providers, MSSP DDoS cloud mitigation providers. Effective coordination during an attack is for all practical purposes *impossible*.
- Servers/services/infrastructure devices which are the targets of DDoS can't signal for mitigation, even if they have the ability to detect and classify DDoS attacks (think Apache mod_security/mod_evasive, BIND RRL).
- ISPs/MSSPs must coordinate (badly, inefficiently) manually when jointly working to mitigate DDoS attacks.
- As attackers shift DDoS vectors/resources, severe latency, common miscuing occurs between defenders.
- Web portals exist; they're specific to vendors/ISPs/MSSPs, have varying degrees of mitigation configurability (most end-customers wouldn't know what to configure), and can be difficult to access during an attack when IDC & client LAN transit are conflated.

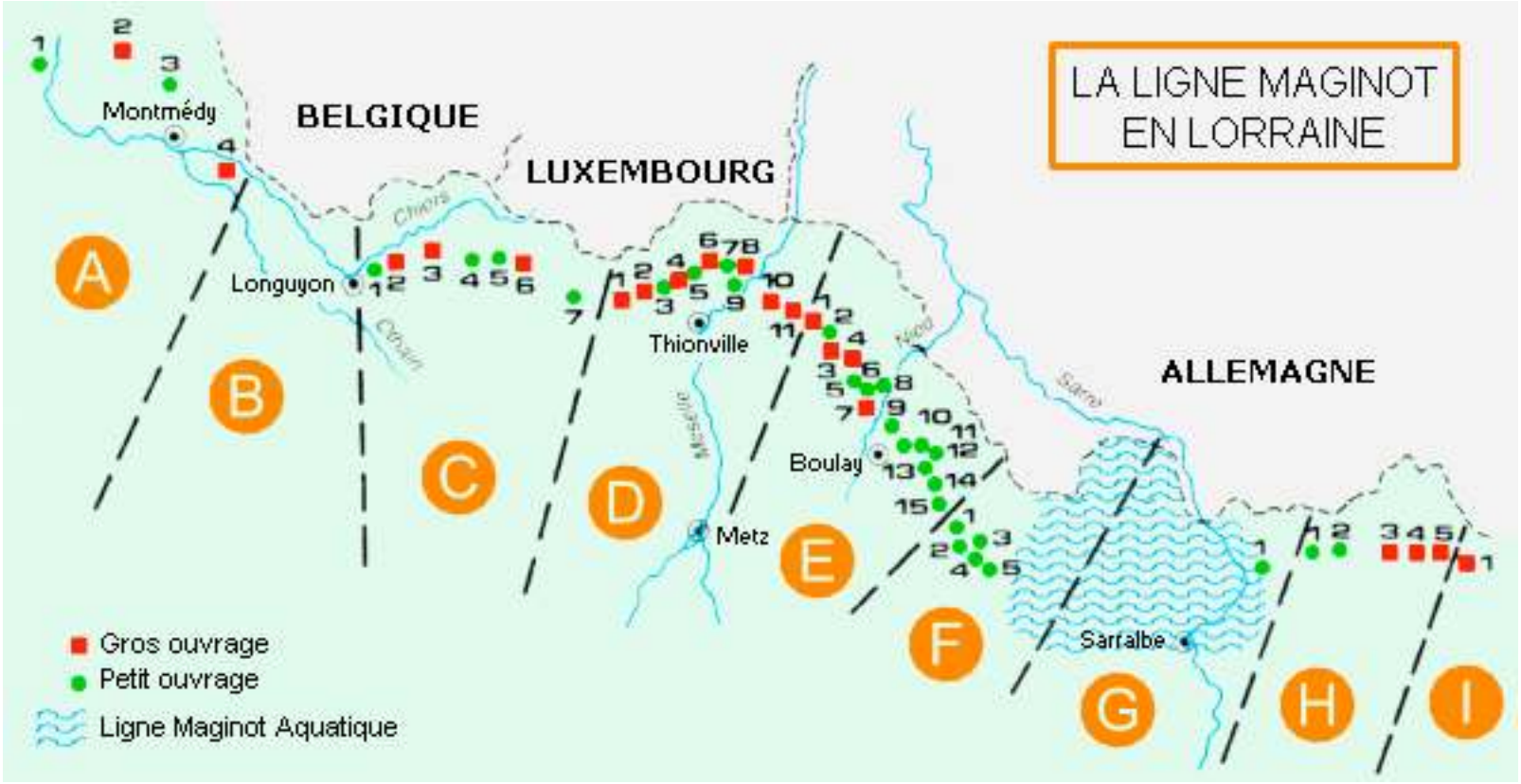
DDoS Defense Becomes a Typing Contest . . .

Attacker.

DDoS Defense Becomes a Typing Contest . . .

Defender.

Largely Static, Low-Agility Defenses . . .



. . . Lead to Predictable Outcomes.

Coordination of DDoS Defenses, Circa 1995.

```
 PINE 4.64   MAIN MENU [A]                        Folder: INBOX  13 Messages

      ?     HELP              -  Get help using Pine
      C     COMPOSE MESSAGE   -  Compose and send/post a message
      I     MESSAGE INDEX     -  View messages in current folder
      L     FOLDER LIST       -  Select a folder OR news group to view
      A     ADDRESS BOOK      -  Update address book
      S     SETUP             -  Configure Pine Options
      Q     QUIT              -  Leave the Pine program


   Copyright 1989-2005.  PINE is a trademark of the University of Washington.
                [Folder "INBOX" opened with 13 messages - 1 new]
? Help                    P PrevCmd                 R RelNotes
O OTHER CMDS > [ListFldrs] N NextCmd                K KBLock
```

Coordination of DDoS Defenses, Circa 2005.

```
 PINE 4.64   MAIN MENU [A]                          Folder: INBOX  13 Messages

      ?     HELP              -  Get help using Pine
      C     COMPOSE MESSAGE   -  Compose and send/post a message
      I     MESSAGE INDEX     -  View messages in current folder
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                [Folder "INBOX" opened with 13 messages - 1 new]
? Help                    P PrevCmd                 R RelNotes
O OTHER CMDS > [ListFldrs] N NextCmd                K KBLock
```

Coordination of DDoS Defenses, Circa 2015.

```
 PINE 4.64   MAIN MENU [A]                        Folder: INBOX  13 Messages

      ?     HELP              -  Get help using Pine
      C     COMPOSE MESSAGE   -  Compose and send/post a message
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? Help                    P PrevCmd                 R RelNotes
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```
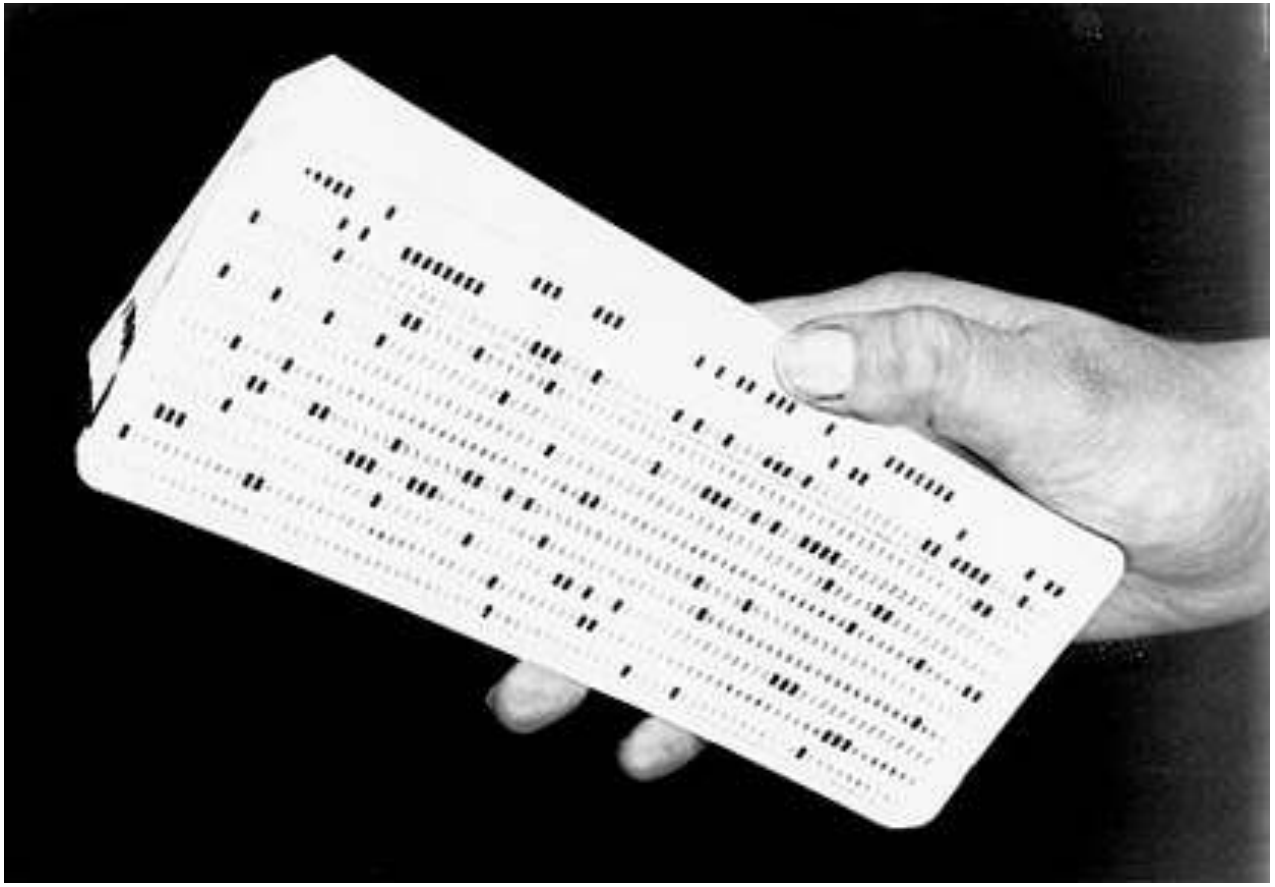
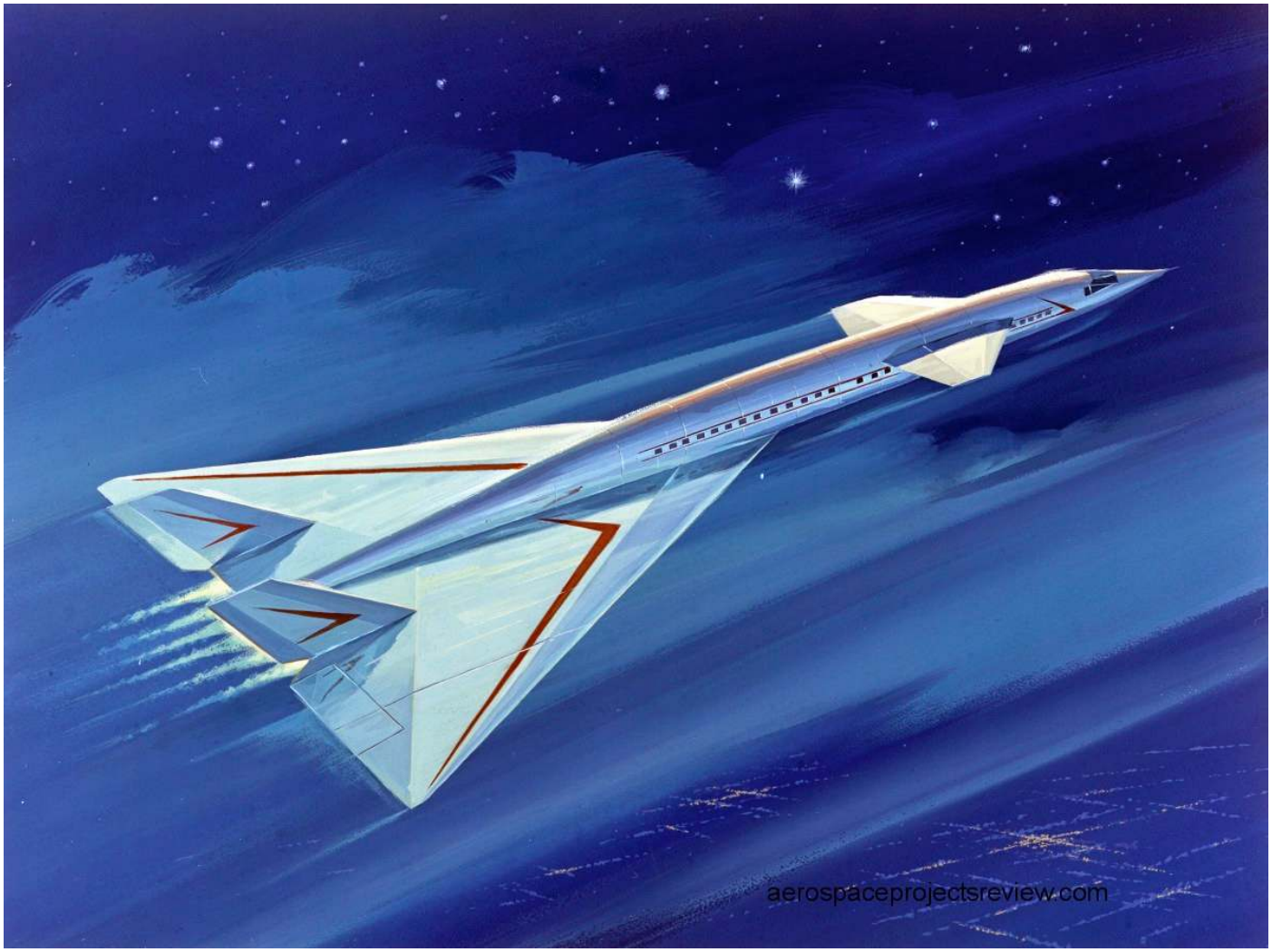

We Can – and *Must* – Do Better Than This!

We Need a Standardized Way of Sharing Information . . .



. . . Across a Fast, Low-Latency, *Unreliable* Transport . . .



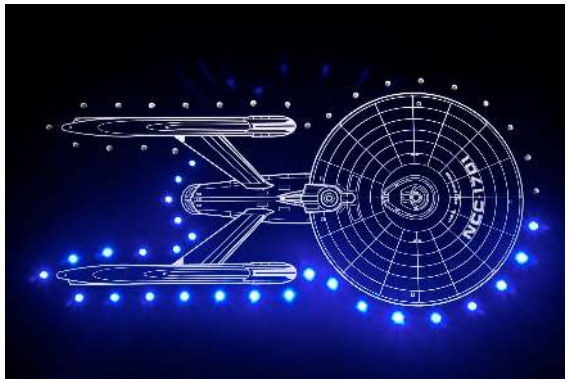
. . . Across a *Reliable* Transport That Will Make It Through *Policies* . . .

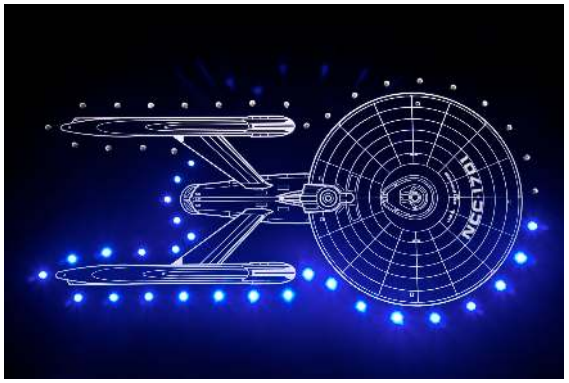
. . . Tell Us About Itself, Its Problems, and Its Desired Actions. . .

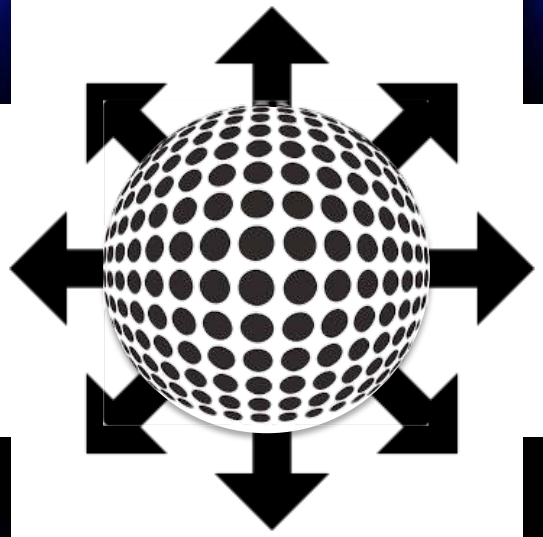
. . . That Can Be Relayed Internally and Externally as Needed . . .

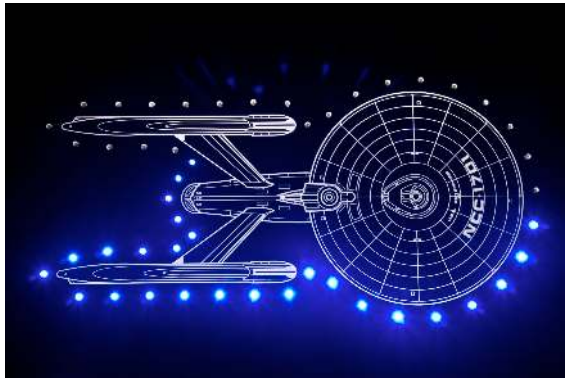
. . . Everyone and Everything on the Network Can Participate . . .

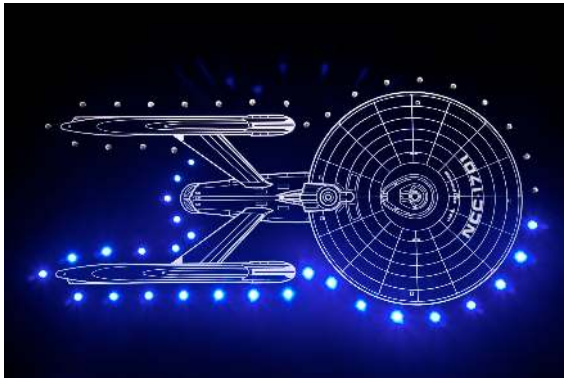
. . . In Coordinated, On-Demand DDoS Defense.











Summary of DOTS Operational Requirements

DOTS Operational Requirements

- Standards-based exchange of DDoS attack and mitigation information.
- Must not assume organic detection/ classification capabilities of supplicant.
- Must work across common unreliable and reliable transports.
- Must support mutual authentication and optional crypto.

DOTS Operational Requirements (cont.)

- Must describe target under attack (IP address range, ports/protocols/services running on target, etc.).
- Must describe desired outcome in general terms (block, redirect, scrub, rate-limit, etc.).
- Must update supplicant with implemented actions and status, supplicant must do same.
- Must support intra- and inter-organizational relays.

DOTS Operational Requirements (cont.)

- Must support policy-based action/outcome filtering and transformation.
- Must be extensible.
- Must focus on DDoS initially, other uses can come later.
- Must minimize complexity of implementation and node interaction.

DOTS Operational Requirements (cont.)

- Must include a 'heartbeat' function.
- Must be detection/classification/mitigation-technology agnostic.
- Must support allowed distribution scope (TLP?).
- Should utilize existing protocols and information models wherever possible and whenever appropriate.

This Presentation – http://bit.ly/1I2IVrF

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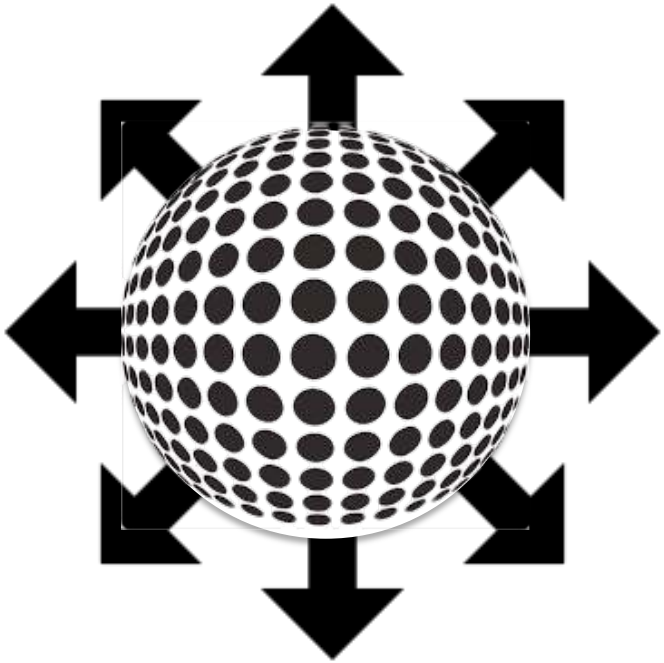

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Thank You!

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