Achieving Instant Situational Awareness in Secure C2 Environments
A Few Common Characteristics of Secure C2 Environments

1. Multiple Networks
   - Often 4+, average 10 to 12, as many as 30

2. Multiple Classifications/Domains

3. Multiple Users, Desks, Consoles, Conference Rooms, etc.
Key Challenges

Thinklogical has a unique hardware & software solution that enables the flexibility, productivity and collaboration required to achieve **Instant Situational Awareness**, while still complying with the relevant Information Assurance Directives – thereby **Mitigating the Insider Threat**

### Information Superiority
- Western Allies have pursued a strategy of Information Superiority for many years
- Multiple petabytes of information collected every day from the Middle East theater alone
- While the U.S. remains at the market forefront, allied governments are accelerating their efforts

### Instant Situational Awareness
- The nature of warfare has changed – events are less predictable and required response times are in hours or even minutes
- Commanders need to quickly assess a vast amount of historical information and access real time video for missions that were unknown just minutes beforehand
- Multiple analysts must have access to multiple sources of information at multiple classifications and be able to quickly and freely collaborate

### Neutralization of the Insider Threat
- Unfettered access to classified information creates the opportunity for accidental, negligent or intentional corruption, compromise or theft of data
- As information collection and storage multiplies, the possibility and impact of data breach events grows exponentially
- While cyber attacks are a well-known major concern, the military and intelligence community must have a similar level of focus on mitigating the Insider Threat
High Level Design Requirements

1. Instant Situational Awareness
   a) Access to any potential source of information that might be needed, for an event that is not predictable
   b) Flexibility to reconfigure desks, consoles and conference rooms when and as the mission changes
   c) Ability to design robust, collaborative and efficient workflows

2. Mitigation of Insider Threat
   a) Dedicated hardware per classification/information source
   b) Hardware and cabling physically separated/air-gapped
   c) USB ports, network cables and hard drives physically isolated from the users

3. Low Cost of Ownership
Legacy Approach
In the Legacy Approach...

• Typically, designers place ~4 computers at each desk

• Networks terminate in the computers or thin clients, at the desk

• Information Assurance Directives mandate computers be separated by up to 1m

• Desk size (~1.4m) is usually not large enough to accommodate such a configuration

• They group the classified computers next to each other on one side… and the unclass on the other. **This violates the Information Assurance Directive calling for physical separation.**

• Designers must guess which networks will be needed at each desk – usually just 4 out of 10 to 30 possible networks

• Changes in networks cabled to desk require an IT team/operational interruption
In the Legacy Approach...

Even with just four computers or sources per desk, physically isolating network cabling by classification (per IA Directive) throughout the center is nearly impossible.

Despite IA Directives, network cables are at every desk – facilitating the Insider Threat.

Despite IA Directives, USB ports are at every desk – facilitating the Insider Threat.
In the Legacy Approach...

- A secure KVM switch is placed on every desk, to switch the 4 computers between 2 displays.

- A video switch is also added, to enable communication to the video wall.

- Nevertheless, collaboration between desks is left unaddressed, and between all desks is practically impossible.

All this equipment creates an operating environment that is cluttered and confusing, with too much power, heat and noise in the user area – not conducive to productivity.
1. Instant Situational Awareness

a) Access to any potential source of information that might be needed, for an event that is not predictable

b) Flexibility to reconfigure desks, consoles and conference rooms when and as the mission changes

c) Ability to design robust, collaborative and efficient workflows

2. Mitigation of Insider Threat

a) Dedicated hardware per classification/information source

b) Hardware and cabling physically separated/air-gapped

c) USB ports, network cables and hard drives physically isolated from the users

3. Low Cost of Ownership
Legacy Approach

Obstructs Instant Situational Awareness &

Facilitates the Insider Threat
Thinklogical Enables Both Instant Situational Awareness and Mitigation of the Insider Threat

Thinklogical’s architecture enables, simplifies and secures any-to-any switching of multiple classifications, creating Instant Situational Awareness in mission critical environments.

Thinklogical System Components

- **Source**
- **Destination**
- **Transmitter**
- **Matrix Switch**
- **Receiver**
- **Control System**

**Secure Transfer of Multiple Data Streams**
- Compatible with all potential sources and classifications
- Signals at input are left 100% unaltered for optimal performance at output
- Physically separates source up to 160 km (80 km from switch) from largest security threat – the user

**Instant, Any-to-Any Switching Capability**
- Isolation technology prohibits signal/data stream compromise or cross-contamination
- Instant access to any source data across multiple classification levels
- System Admin sets restriction schema in firmware – "unhackable" architecture – perpetrator must gain physical access to switch

**High Output Performance Across Multiple Devices**
- Users receive full data bandwidth and video resolution, with no added latency
- Customizable software allows for high productivity collaboration
- Any-to-any switching allows for sharing to the video wall, another desk or another room, while optimizing space utilization

- **Thinklogical Enables Both Instant Situational Awareness and Mitigation of the Insider Threat**
Part 1: Extension
Thinklogical Part 1: Extension
Thinklogical Part 1: Extension

GET THE COMPUTERS OFF THE WATCH FLOOR!
Improve Productivity and Mitigate the Insider Threat

Transmitter

80 kilometers / 50 miles UNCOMPRESSED
No Latency, Lost Frames or Artifacts

Receiver

Keyboard, Mouse, Joystick, All Displays, Video Walls, Headsets/Speakers, CAC Card Readers, Other Authentication Devices

Computers, Thin/Zero Clients, Cloud, Cable Boxes, Video CODECs, Cameras, BluRay Players, etc.
Thinklogical Part 2: Switching

Any-to-Any Switching

Collaboration

Flexibility, Efficiency

Availability

Multiple Levels?
Isolation Technology

Thinklogical Switching Systems are accredited worldwide to carry multiple classifications simultaneously because of Thinklogical’s unique **Isolation Technology**

1. **Isolated on each FIBER**
   - Only one stream of data, and therefore only one classification of data is transmitted per fiber
   - Fiber does not emit compromising emanations, so it may be routed in any convenient path with no chance of the data stream being compromised

2. **Isolated in the SWITCH**
   - Only one stream of data is carried per copper trace in the switching system
   - Proven in accreditation labs that the signal stream is 900x greater than crosstalk => No chance for crosstalk to survive

3. **Isolated in the CONTROL SYSTEM**
   - Data streams do not flow through the control system
   - Unauthorized access to the control system will reveal only a list of connections, not the data being transmitted

---

*Thinklogical is the only company in the world with large scale, fiber optic matrix switching systems that have been tested and proven to isolate data streams - and thus accredited to carry multiple classifications of information in a single switch*
Thinklogical is the Only Accredited Solution

Thinklogical has distinguished its solution from legacy approaches and commercial providers by achieving internationally recognized and difficult-to-obtain certifications and accreditations

- Customers requiring highest security / performance utilize certifications and accreditations to screen supplier technology for use in multiple classification environments

The Common Criteria, EAL4 certifies vendor solutions to various security levels through independent third-party testing laboratories

- EAL4 is the highest level that can be achieved for a solution like Thinklogical’s
- “Must-have” certification for secure intelligence / defense applications in the U.S. and 25 Allied Governments under the Common Criteria Recognition Agreement

TEMPEST qualifies solutions for compromising emanations (electromagnetic radiation that can be used to reconstruct intelligible data)

- Thinklogical solutions are approved to SDIP 27, Level B (a perpetrator cannot eavesdrop content unless they are within 20 meters of the system), meeting the need of multiple classification command and control environments

US DoD JITC Certification ensures IT solutions are interoperable and support DoD mission needs

NATO IACD “Green” is a “customer-led” certification that approves Thinklogical solutions for use in NATO multiple classification environments up to and including the highest levels of classification

Thinklogical offers the only large scale, fiber switching and extension solution with EAL4 and TEMPEST certifications
Thinklogical serves leading military branches and intelligence agencies in the U.S. and around the world, as well as many of the most demanding Broadcast / Post-Production, Nuclear Power, Utilities and Oil and Gas Companies.

### U.S. Military and Intelligence

- [National Security Agency](#)
- [Central Intelligence Agency](#)
- [Defense Intelligence Agency](#)
- [National Reconnaissance Office](#)
- [National Geospatial-Intelligence Agency](#)
- [U.S. Coast Guard](#)
- [U.S. Army](#)
- [U.S. Navy](#)
- [U.S. Air Force](#)
- [U.S. Marines](#)
- [Defense Advanced Research Projects Agency](#)
- [Defense Health Agency](#)
- [Defense Information Systems Agency](#)
- [U.S. Strategic Command](#)
- [U.S. Northern Command](#)

### International Defence and Intelligence

- [Norway](#)
- [Israel](#)
- [UK](#)
- [Australia](#)
- [Canada](#)
- [NATO](#)

### Other U.S. Government

- [Transportation Security Administration](#)
- [Sandia National Laboratories](#)
- [Los Alamos National Laboratory](#)

### Commercial Customers

- [Disney](#)
- [Apple](#)
- [ESPN](#)
- [Westinghouse](#)
- [Petronas](#)
- [Ternium](#)
Cost of Ownership

### Measurable Benefits

1. Lower cost of fiber vs. copper
2. Less computers, thin clients, video codecs, cable TV boxes, etc. – and all the licenses that go with them – due to ability to pool resources
3. Cost of ownership of equipment is lower due to location in IT controlled environment
4. Less air conditioning required in user area, where it is harder to cool equipment that is under desks (partially offset by increased a/c in secure rack room)
5. Less space required per desk in user area (partially offset by larger secure rack room required)
6. Any to any switching results in less design and planning time for center
7. Elimination of the IT service costs associated with reconfiguring and repairing desks, conference rooms, auditoriums, etc.
8. Useful life of Thinklogical infrastructure is 7 to 12 years

### More Difficult to Measure

1. Increased productivity due to:
   a) Less heat, noise and clutter
   b) Higher availability
   c) Any to any switching → more robust workflows
   d) More collaboration → more robust workflows
2. Mitigated Insider Threat
## Thinklogical Approach Scorecard

### 1. Instant Situational Awareness
- **a)** Access to any potential source of information that might be needed, for an event that is not predictable
- **b)** Flexibility to reconfigure desks, consoles and conference rooms when and as the mission changes
- **c)** Ability to design robust, collaborative and efficient workflows

### 2. Mitigation of Insider Threat
- **a)** Dedicated hardware per classification/information source
- **b)** Hardware and cabling physically separated/air-gapped
- **c)** USB ports, network cables and hard drives physically isolated from the users

### 3. Low Cost of Ownership
About Thinklogical

- Founded in early 2000’s
- Headquartered in Milford, CT
- Products manufactured in USA
- ISO 9001:2008 Certified
- Voted by employees as one of CT’s Top Places to Work in 2013, 2014 and 2016 and 2017
- A Belden Brand
Come Visit Us!

Thinklogical Canberra Demo Center
Unit 13, 41/45 Tennant Street
Fyshwick
Select Case Studies
(Time Permitting)
Overview

- STRATCOM approached Thinklogical five years ago with the challenge of building one of the largest, high-availability, multi-classification operation centers in the world.

- **Key Requirements**
  - The original requirements included fully-redundant, several hundred desk center, with each desk having three displays and access to five networks of multiple classifications. Today, management believes the actual size to have grown at least 3x – an indication of the growth of the need for command and control over the past five years.
  - Imperative to NOT have network ports at the desk to mitigate the Insider Threat.
  - Essential to have flexibility (the ability to immediately change configurations to meet the mission) and 24x7x365 availability.

Thinklogical Solution

- Thinklogical was chosen as the sole-source provider for STRATCOM’s video and KVM system.
  - Only architecture in the world that had the non-blocking scale to manage this many sources and destinations, as well as key accreditations (EAL4), any-to-any switching capability for multiple classifications and the ability to create a fully redundant system.

- The Company provided a dozen TLX 640 and TLX 320 switches with several thousand pair of extenders, a control system and extended warranty.

- Thinklogical’s unique solution allowed STRATCOM to respond to any new situation quickly and productively, without physical reconfiguration of the desks and briefing centers in their facilities, while also mitigating the Insider Threat.

STRATCOM's new underground operation center will be inside a thick steel cube, encased in a concrete shell, surrounded by catwalks and scaffolding.
Case Study: Norway Military and Intelligence

Sale of first generation switch (DCS) to National Security Authority (waiver required)

2005
First major VX wins include National Joint HQ and a Classified Command Center
VX Switches receive EAL4

2010
NATO Joint Warfare Center (Stavanger) chooses TL
Switches receive TEMPEST approval & EAL 4; Listing on NATO NIAPC

2011

2012

2013

2014
TL Wins Norwegian Army Intel Center

2015
TL wins PST Phase II

2016
TL wins Orlandet F35 Air Station
TLX Switches achieve EAL4

TL wins Norwegian Secret Police (PST) Phase I
**US Littoral Combat Ships (LCS) – Independence Class**

**LCS Objectives**
- Easily switch between three missions within 72 hours: anti-submarine, anti-surface, mine countermeasures
- Reduce crew by 25%

**LCS Thinklogical Design**
- System use primarily for bridge control (KVM), as well as video distribution to other locations
- Redundant systems run in parallel, end to end
  - Sources are redundant, and are transmitted through separate systems (Transmitter, Matrix Switch, Receiver)
  - Creates a port-side system, and a starboard-side system
- User stations in the bridge receive data from both port and starboard systems
  - In the event one system experiences a failure, the bridge maintains access to all of the necessary data
- Redundant video receivers maintain links to both systems, and provide video feeds to Executive Officers, Commanding Officers and conference areas
- Dual, triple and quad head configurations with full KVM capability (USB HID, USB 2.0, Audio)
- 48 to 80 Port Matrix Switches
Case Study: Israel – Classified (2015/16)

The Challenge

Overview: The Israeli MOD approached Thinklogical with a need for a video and peripheral distribution system for a very large (2nd largest Thinklogical has ever designed) operations center in the Negev desert in Southern Israel.

Requirements:

- Thousands of “sources” and “destinations”
- Mission could not suffer lower video quality or latency
- The customer cared deeply about EAL 4 accreditation
- Availability was paramount; the customer needed a fully functional center 24 x 7 x 365
- Perhaps most importantly, the customer wanted a customized user interface to drive collaboration, productivity and total cost of ownership

The Thinklogical Solution

Thinklogical was chosen as the provider for Israel’s new operations center because they were the only solution available in the world with:

- **Non-blocking matrix switches** that could scale to manage this many sources and destinations
- Uncompressed video with no additional latency
- Common Criteria EAL 4
- Extremely **high resiliency and availability** through a host of redundant features, functions and configurations
- The creation of several customized software control features that allowed the customer to create unique productivity and collaboration scenarios, including advanced pooling, reserving and assignment of sources
“At the heart of the upgraded systems will be Lockheed Martin’s CMS 330 combat management system, pulling together all sensor data and fusing it using the latest techniques to deliver a state-of-the-art picture from which the combat teams will be able to fight their ship. The CMS will provide up to nine new Multi-functional Workstations, each with three screens.”
Please visit us at Stand F41!

Joe Pajer, President & CEO
Larry Wachter, Vice President - Engineering
Alexandra Cheever, Director - Product Management
John Coetzer, Business Development - Australia