

**INJECTING
ELECTROMAGNETIC PULSE
INTO DIGITAL DEVICES**

- HISTORY OF EMP
- STARFISH
- MARX GENERATOR
- PULSE PARAMETERS
- DUMP DEVICES
- SMART DEVICES
- BYZANTINE FAULTS
- SCADA

- HOSPITALS
- EMP IS MICROPROCESSOR AND OS
- INDEPDENTENT
- GREEN REVOLUTION
- FLY BY WIRE
- TWA 800
- EMP DEVICE IN A CAMERA

- $\frac{1}{2} * C * V * V = \text{POWER IN JOULSE}$
- POWER GRID
- POWER QUALITY
- TESLA COIL

HISTORY OF EMP

- COMPTON EFFECT(H BOMB)
- TESLA COIL
- MARX GENERATOR
- EXPLOSIVE DEVICE ARMATURE

H BOMB STARFISH

- 1962 US EXPLODED AN H BOOM 800 MILES FROM OAHU HAWAII
- 30 STRINGS OF STREET LIGHTS WENT OUT
- 300 STREET LIGHTS IN ALL

THE MARX GENERATOR

- INVENTED IN 1924
- NOVEL CONCEPT TO CREATE HIGH VOLTAGE
- CAPACITORS ARE CHARGED IN PARRALL
- CAPACITORS DISCHARGE IN SERIES

PULSE INJECTING

- ELECTRICAL LINES
- TELEPHONE
- CABLE
- COAXIAL
- NETWORK
- GROUNDING STRAP

DUMB DIGITAL DEVICES

- SIMPLE DIGITAL DEVICES
- THEY KEEP ON WORKING AFTER BEING PULSED
- STAND ALONG SENSORS (TEMP,PRESSURE,VOLTAGE)
- A TYPE OF EMP FUZZING

SMART DEVICES PULSED

- THEY REBOOT
- THEY NEED SOME OPERATOR TO MANUALLY RESET
- THEY TURN OFF

CONTROLLING A NETWORK OF DEVICES

- AS LONG AS YOU KEEP PULSING THEY CAN NOT BRING THE NETWORK UP
- LINUX,UNIX,SUN,WINDOWS,ROUTERS FIRE WALL
- THEY WILL NOT BE ABLE TO REBOOT

MOORES LAW

- EVERY 18 MONTHS THE NUMBER OF TRANSISTORS DOUBLES THAT CAN BE PUT ON A SILICON WAFER
- DIE SIZE DECREASES
- VOLTAGE DECREASES

NOT ALL EMP THE SAME DESIGNER EMP

- PULSE WIDTH
- PULSE RISE TIME
- PULSE RATE
- HARMONICS
- FREQUENCY

BYZANTINE FAULTS

- LARGE REALTIME DISTRIBUTED SYSTEMS
- BYZANETINE FAULT TOLERANCE AND RECOVERY
- N IS THE NUMBER OF PROCESSES
- T IS THE NUMBER OF CORUPTED PROCESSES
- A SOLUTION IS ONLY POSSIBLE IF
- $N > 3T + 1$

SUPERVISORY CONTROL AND DATA ACQUISITION

- LARGE REALTIME DISTRIBUTED SYSTEMS
- CONTROL, CHEMICAL, WATER, OIL, POWER SYSTEMS
- LARGE MIX OF SMART AND DUMB DEVICES
- FUZZING OF DUMB DEVICES

GOING GREEN

- GREEN BUSES SOLID STATE ENGINEER CONTROLS
- GREEN CARS

ROBOTIC TRAIN

- L TRAIN NYC
- DC METRO TRAIN
- THIRD RAIL SHOE ARC

FLY BY WIRE

- BOEING THE PILOT IS IN CONTROL
- AIR BUS THE COMPUTER IS IN CONTROL

TWA FLIGHT 800

- 75 MILL JOULES
- CENTER FUEL TANK
- ARTIFACT PULSE ON THE BLACK BOX
- THE BLACK BOX WOULD SHOW AN ARTIFACT OR DAMPED RINGING IF THE PLANE WAS PULSED

$\frac{1}{2} * C * V * V = \text{POWER IN JOULES}$

- C= CAPACITENCE, V=VOLTAGE
- C=102 MICROFARDS
- V=300 VOLTS
- APROX 4.5 JOULES

AIR FRANCE 447

- AIR BUS 330-200

HOSPITALS ARE MICRROPROCESS RICH

- DUMB DEVICES
- SMART DEVICES SOMEONE WILL
HAVE TO RESET THEM
- PATIENT MONITORING
- VENTILATORS

POWER GRID

- THREE MAJOR SUBGRIDS
- EAST GRID, WEST GRID, TEXAS
- HVAC, HIGH VOLTAGE AC GRID
- HVDC, HIGH VOLTAGE DC GRID

POWER QUALITY

- INDUCTANCE
- CAPACITANCE
- HARMONICS
- TRANSIENTS

THE GADGET

- 20-30 DEVICES
- COST \$25K-35K
- THE GADGET WILL BE 60% BASED ON THE TELSA COIL
- SOLID STATE(MOSFET IGBT)
- TUBE 833A

GRID STRESSORS

- NEW NETWORK WORM
- NEW WIN VIRUS
- SOFTWARE CHANGE CYCLE
- HOT WEATHER
- INJECTING PULSES INTO THE GRID

BRING DOWN THE NORTH AMERICAN POWER GRID

- 20-30 DEVICES
- DISTRIBUTE OVER WEAK NODES
- EACH DEVICE WOULD HAVE TO BE TUNED
- DO ABLE