



1000BASE-T

Automatic Crossover Algorithm

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Workgroup
Networks
Division



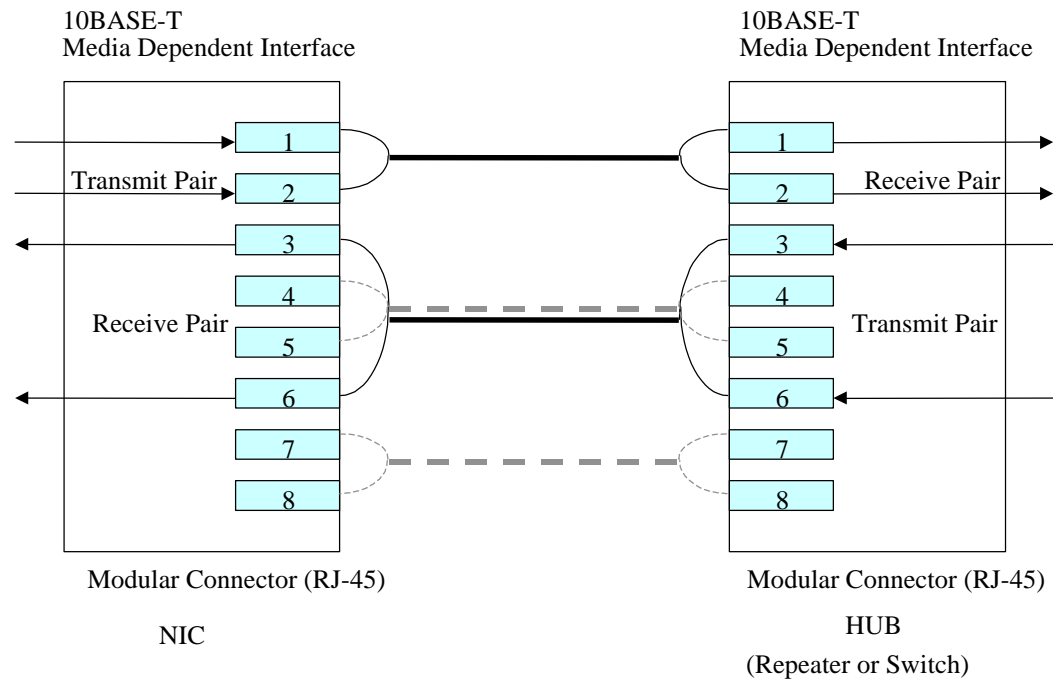
OBJECTIVES

- Automatic determination of MDI or MDIX configuration
- Interoperability with existing products
- Rapid Resolution of MDI or MDIX configuration
- Robust (No pathological lock-up)
- Easily Implemented



Straight Through Cable

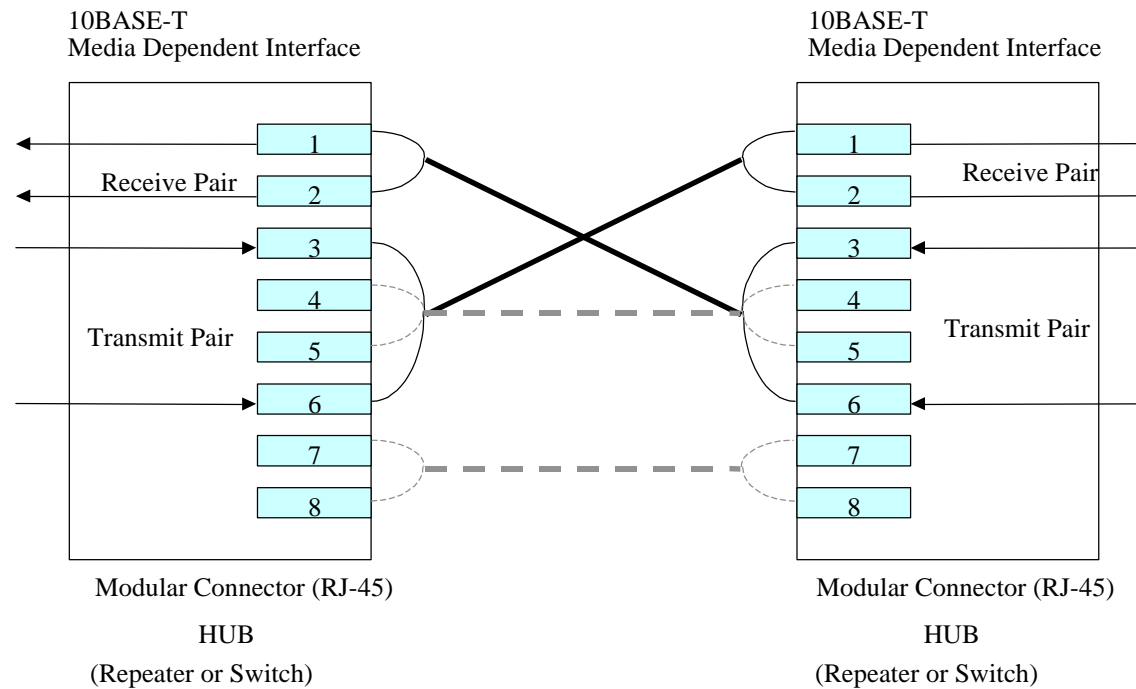
(traditional solution)





Crossover Cable

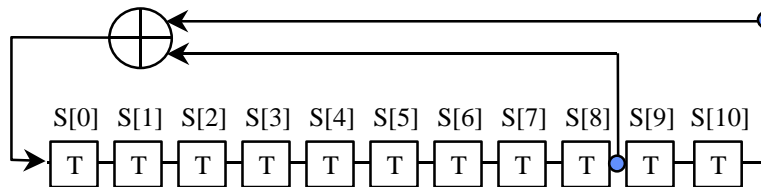
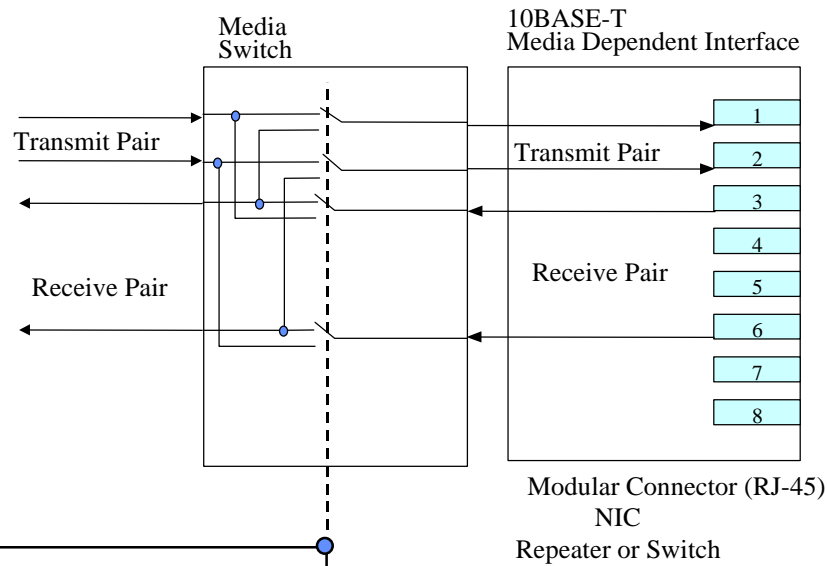
(traditional solution)





Crossover Switch for 2-pair System

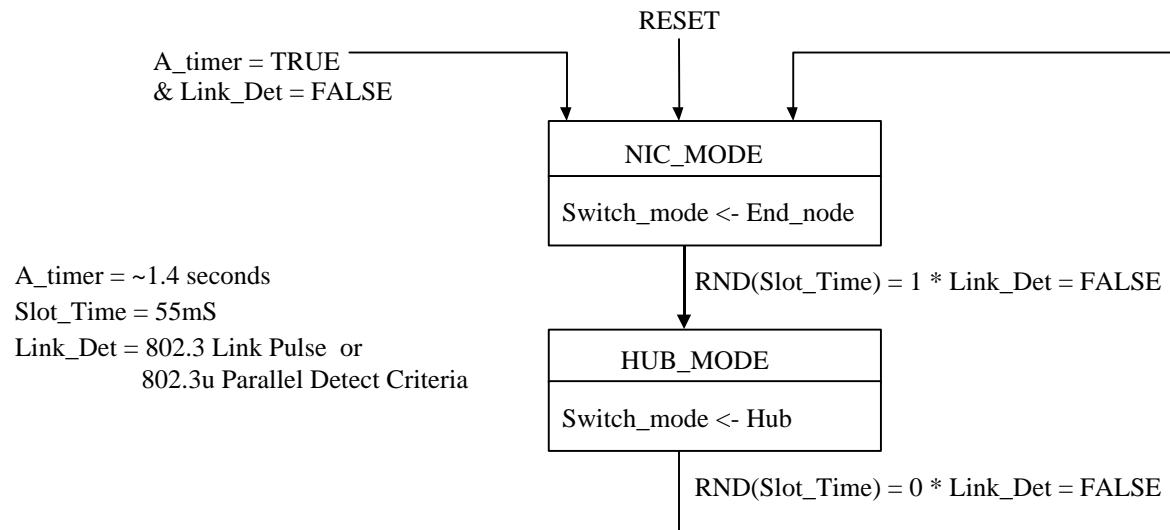
(logical representation)



Clocked with ~ 55mS period
 Reset every ~ 1.4 with asynchronous timer
 Initialized to random seed value

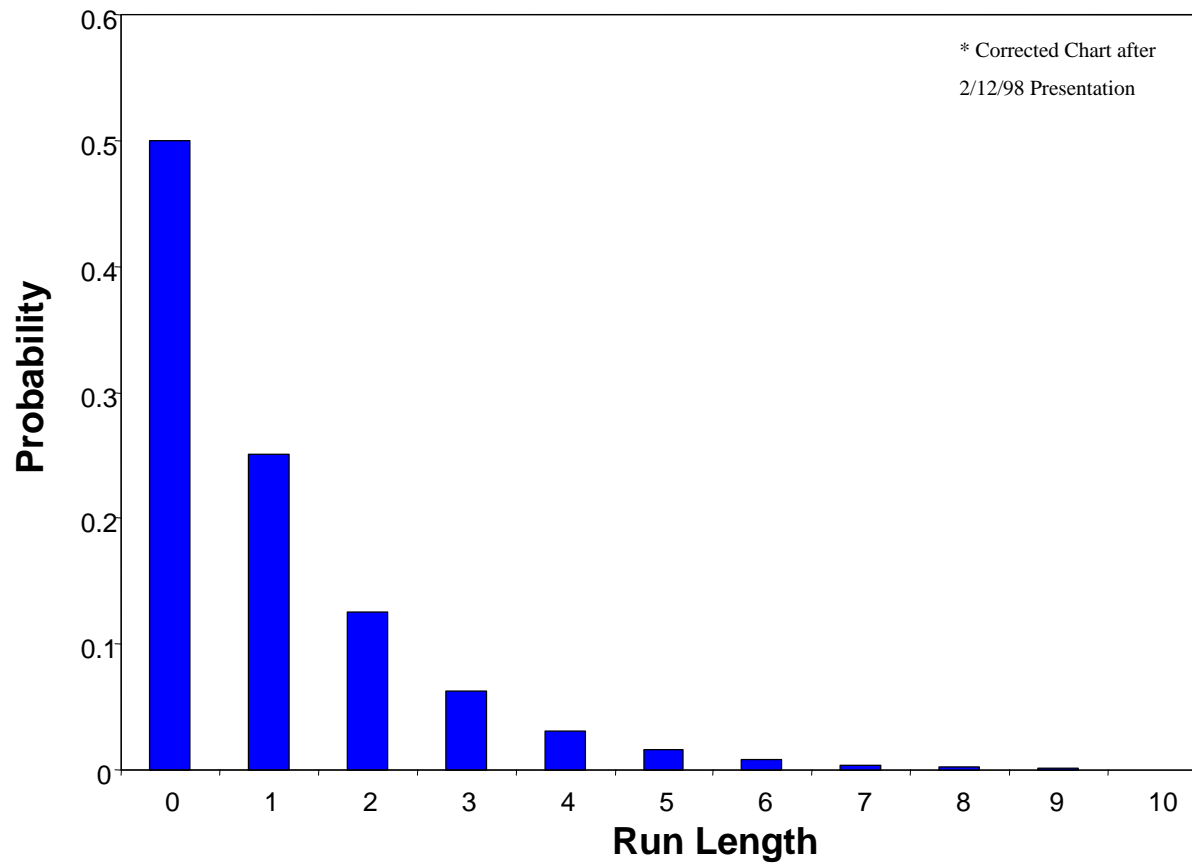


Control Algorithm





Probability of Run Length Alignment





Conclusions

- ✓ Automatic determination of MDI or MDIX configuration
 - ◆ State Machine Controlled MDI configuration
- ✓ Interoperability with existing products
 - ◆ Since existing products don't switch, connection is guaranteed within two cycles
- ✓ Rapid Resolution of MDI or MDIX configuration
 - ◆ Normal algorithm resolves within 500mS
- ✓ Robust (No pathological lock-up)
 - ◆ Extremely rare ($2e-22$) case resolves via asynchronous reset
- ✓ Easily Implemented
 - ◆ For 1000BASE-T all four pairs are capable of transmitting and receiving
 - ◆ Very low logic cost
 - ◆ For 10 and 100T may be implemented with CMOS switches