Startup Protocol for 1000Base-T

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Motivation

- Baud-rate receiver uses joint adaptation of forward and feedback equalizers, echo and NEXT cancellers, and timing recovery
- A completely blind start of the baud-rate receiver is difficult
- Initial convergence is greatly facilitated if the receiver is started in half-duplex mode.
- The state diagrams in the following viewgraphs are intended to replace the diagram of clause 32.2.5 of 100Base-T2



Start-up Protocol

	MASTER	Direction of Signals	SLAVE
~ 1ms	Transmit Train echo, NEXT Wait for IDLE from Slave		Receive in half-duplex Train equalizer Acquire timing synchronization, wire polarity, pair identif., delay adj.,etc.
~ 1ms	Stop transmitter Train equalizer Adjust phase of receiver (frequency already known) wire polarity, pair identif., delay	v adj.,etc.	Start transmitting Freeze frequency and phase of timing recovery Train echo and NEXT cancellers Freeze FFE, DFE
~ 1ms	Restart transmitter Freeze phase adjustment Train echo & NEXT cancellers Freeze FFE, DFE		Unfreeze frequency and phase control Enable FFE, DFE update
	Unfreeze phase control Initiate normal transmission		Initiate normal transmission

*NOTE: If a second order (Proportional + Integrating) timing recovery loop is used, frequency error after initial acquisition will be very small, therefore the phase drift during this "open loop" period will be negligible. The phase will still be correct when timing recovery is unfrozen.



Training State Diagram (Master)



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Training State Diagram (Slave)



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