Clause 28 Auto-Negotiation and 1000 Mb/s Link Configuration are Different

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They Work on Different Media

	Clause 28 Auto-Negotiation	1000 Mb/s Link Configuration
UTP links	✶ For UTP links using RJ-45 connector ✶ 10 & 100 Mb/s UTP were defined for 100BASE-T ✶ 1000 Mb/s UTP <future>	
Fiber, TW-cable		✶ For fiber ✶ For short copper links ✶ 1000 Mb/s only

Clause 28 Auto-Negotiation: Legacy Issues

Clause 28 had to address a lot of constraints

- ✶ Legacy 10BASE-T link pulse compatibility
- ✶ Parallel detection for non-FLP capable devices
- ✶ Communications of scrambler states, master/slave settings, etc.

In response to these constraints, clause 28 developed

- ✶ Fast link pulses
- ✶ Next page features

(It's fairly complex)

1000 Mb/s Link Configuration: What's It For?

1000 Mb/s fiber (13000-nm singlemode and multi-mode)

1000 Mb/s fiber (780-nm multi-mode)

Short copper links (25-m TW-style twinax)

Clause 28 Auto-Negotiation is not defined for any of these media.

Fast link pulses don't work over fiber.

1000 Mb/s Link Configuration: Basic Assumptions

At 1000 Mb/s, we can make some assumptions

- Assume use of full-duplex, synchronous links
- Assume use of 1000 Mb/s signaling
- Assume use of 8B10B coding

Link configuration takes advantage of the basic assumptions

- It uses a special 8B10B code “C” to mark configuration words
- After that, the configuration word format is similar to Auto-Negotiation

➡ It copies all the relevant parts of Auto-Negotiation, customized to our new situation

What the Two Systems Have In Common

16-bit control registers

Concept of exchanging registers multiple times

Use of “ACK” bit

Some information bits are the same

Some information bits are different

- ✶ No need for scrambler states
- ✶ No need for parallel detection
- ✶ No need to reserve bits for legacy capabilities that can’t work on fiber or TW-style cable

Comparison of Control Register Formats

New at 1000 Mb/s
Not for lower speeds
No backwards compatibility

1000 Mb/s Link Configuration

- Base page

Pause1
Pause2

X	X	X	X	X	FD	HD	P1	P2	X	X	X	RF	AK	NP

Auto-Neg. (T2)

- Base page
- Next pages (msg. 7)

	selector					technology ability field								
0	0	0	0	1	10—T	100-TX	T4	P	100-T2	RF	AK	NP		
HD	FD	R	MS	seed					T	AK2	MP	AK	NP	
seed								X	T	AK2	MP	AK	NP	

We can define next pages and pause bits as needed for 1000BASE-T

Conclusions

It’s OK to have two configuration systems

- 10BASE-T legacy compatibility is not an issue for 1000 Mb/s fiber or short copper

Clause 28 Auto-Negotiation	1000 Mb/s Link Configuration
↓	↓
10/100/1000 Mb/s UTP	1000 Mb/s fiber and TW-style cable (8B10B-coded)