

Updates to 800GBASE-LR1 and 800GBASE-ER1 Rx Optical Power Specifications

Addressing comments 108, 109, 110, 111, 113, 114

Eric Maniloff - Ciena

IEEE P802.3dj

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Comment addressed

A group of related comments was submitted covering updates to the optical power specs

CI 185	SC 185.6.2	P551	L34	# 108
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
In addition to the Average Receive Power (min) there should be an entry for Receiver Sensitivity. Average Receive power is at TP3 including link optical impairments, while sensitivity (informative) is defined without optical impairments.				
<i>SuggestedRemedy</i>				
Add an entry in Table 186-6 for Receiver Sensitivity (Average Power, max) with units of dBm as an informative specification. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

CI 185	SC 185.8.15	P556	L46	# 109
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
Average receive power as specified in Table 185-6 should include optical impairments, and be specified with the minimum Transmitter OSNR.				
<i>SuggestedRemedy</i>				
Update the definition for Average receive power in 185.8.15 to specify that is specified at TP3, and includes the Optical Penalties defined in Table 185-7. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

CI 185	SC 185.8.x	P556	L50	# 110
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
A definition for Receiver Sensitivity should be provided. Receiver Sensitivity does not include Optical Penalties, and is an informative specification.				
<i>SuggestedRemedy</i>				
Add a definition for receiver sensitivity in Clause 185.8. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

CI 187	SC 187.6.2	P624	L33	# 111
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
In addition to the Average Receive Power (min) there should be an entry for Receiver Sensitivity. Average Receive power is at TP3 including link optical impairments, while sensitivity (informative) is defined without optical impairments. A supporting presentation will be provided.				
<i>SuggestedRemedy</i>				
Add an entry in Table 187-6 for Receiver Sensitivity (Average Power, max) with units of dBm as an informative specification. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

CI 187	SC 187.8.16	P629	L45	# 113
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
Average receive power as specified in Table 187-6 includes optical impairments, and is specified with the minimum Transmitter OSNR.				
<i>SuggestedRemedy</i>				
Update the definition for Average receive power in 187.8.16 to specify that is specified at TP3, and includes the Optical Penalties defined in Table 187-7. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

CI 187	SC 187.8.17	P629	L49	# 114
Maniloff, Eric		Ciena		
Comment Type	T	Comment Status	X	
A definition for Receiver Sensitivity should be provided. Receiver Sensitivity does not include Optical Penalties, and is an informative specification.				
<i>SuggestedRemedy</i>				
Add a definition for receiver sensitivity in clause 187-7. A supporting presentation will be provided.				
<i>Proposed Response</i>	<i>Response Status</i> O			

Overview

Both 800GBASE-LR1 and 800GBASE-ER1 include Rx specs for Average Receive Power (min)

- This is the minimum Rx power at TP3, and includes allocations for link impairments

Both specs should have Receiver Sensitivity specifications as well

- Rx Sensitivity is defined without link impairments

This contribution includes

- Receiver Sensitivity specifications for Clauses 185 and 187
- Definitions for Receiver Sensitivity
- Updated definitions for Average Receive Power to clarify

Receive Power Specifications

Clause 154 (100GBASE-ZR, 802.3ct) includes both amplified (DWDM) and unamplified (Power limited) applications

For the unamplified application, two optical power specifications are defined

- Average Optical Power (min) – The minimum power to meet the BER requirements at TP3, including attenuation and link impairments - Normative
- Receiver Sensitivity (max) – The optical power required to meet the BER requirements without any optical impairments - Informative

Currently 800GBASE-LR1, 800GBASE-ER1, and 800GBASE-ER1-20 specify the Rx Average Receive power at TP3

Adding a sensitivity spec will help clarify the optical specifications

- The sensitivity spec will equal the Average receive power – the Penalty Allocations

800GBASE-LR1

Tx	Average launch power (min)	-11.2	dBm
	for $ETCC \leq 1$ dB	-12.2 + ETCC	
	for $1 < ETCC \leq 3.4$ dB		

Rx	Average receive power (min)	-17.5	dBm
	for $ETCC \leq 1$ dB	-18.5 + ETCC	
	for $1 < ETCC \leq 3.4$ dB		

Link	Parameter	Value	Unit
	Power budget	6.8	dB
	Operating distance	10	km
	Channel insertion loss ^a	6.3	dB
	Maximum discrete reflectance	-27	dB
	Allocation for penalties ^b	0.5	dB
	Additional insertion loss allowed	0	dB

Add:

Receiver Sensitivity (Average Power, max)

For $ETCC \leq 1$ dB -18 dBm

For $1 < ETCC \leq 3.4$ dB -19 + ETCC dBm

800GBASE-ER1

Tx

Description	800GBASE-ER1-20	800GBASE-ER1	Unit
Average launch power (max)	-7	-1	dBm
Average launch power (min)	-11	-5	dBm

Rx

Average receive power (min)	-18		dBm
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Link

Parameter	800GBASE-ER1-20	800GBASE-ER1	Unit
Power budget	7.5	13	dB
Operating distance	20	40	km
Channel insertion loss ^a	7	12	dB
Maximum discrete reflectance	-27		dB
Allocation for penalties ^b	0.5	1	dB
Additional insertion loss allowed	0		dB

Add:

Receiver Sensitivity (Average Power, max)

800GBASE-ER1-20: -18.5dBm | 800GBASE-ER1: -19 dBm

Sensitivity Definition in 802.3 Clause 154

Definition from in-force Clause 154:

Receiver sensitivity is defined as the minimum value of average receive power at TP3 to achieve the specified maximum BER in 154.1.1. This is to be met with a transmitter with worst-case values of error vector magnitude, optical return loss at TP2, connector degradations, and OSNR. This does not have to be met in the presence of impairments caused by the DWDM black link, such as dispersion or reflections from the optical path. These effects are specified separately in the allocation of maximum optical path power penalty.

Sensitivity Definition, Clause 185

Receiver sensitivity is defined as the minimum value of average receive power at TP3 to achieve the specified maximum FLR in Clause 185-2. Receiver sensitivity does not have to be met in the presence of link impairments captured in the penalty allocations in Table 185-7, such as dispersion, PDL, or reflections from the optical path.

The conformance test signal applied at TP3 meets the requirements for an 800GBASE-LR1 transmitter followed by an attenuator.

The ETCC of the transmitter is measured according to Clause 185.9. The ETCC is then used to calculate the Receiver Sensitivity specified in Table 185-6.

Sensitivity Definition, Clause 187

Receiver sensitivity is defined as the minimum value of average receive power at TP3 to achieve the specified maximum FLR in Clause 187-2. Receiver sensitivity does not have to be met in the presence of link impairments captured in the penalty allocations in Table 187-7, such as dispersion, PDL, or reflections from the optical path.

The conformance test signal applied at TP3 meets the requirements for an 800GBASE-ER1 transmitter followed by an attenuator, including the maximum ETCC specified in Table 187-5.

Average Receiver Power definition, 800GBASE-LR1

Average receive power should specify that it is measured at TP3, and includes optical link impairments.

Updated Definition

The average receive power defines the range of average receiver input power at TP3 over which the frame loss ratio requirement in 185.2 has to be met including optical impairments.

The conformance test signal meets the requirements for an 800GBASE-LR1 transmitter, followed by optical impairments as specified in Table 185-6 and Table 185-8.

The ETCC of the transmitter is measured according to Clause 185.9. The ETCC is then used to calculate the Average Receive Power requirement specified in Table 185-6.

This power may be measured per IEC 61280-1-3.

Average Receiver Power definition, 800GBASE-ER1-20 and 800GBASE-ER1

Average receive power should specify that it is measured at TP3, and includes optical link impairments.

Updated Definition

The average receive power defines the range of average receiver input power at TP3 over which the frame loss ratio requirement in 187.2 has to be met including optical impairments.

The conformance test signal meets the requirements for an 800GBASE-ER1 transmitter, including the maximum ETCC specified in Table 187-5, followed by optical impairments as specified in Table 185-6 and Table 185-8.

This power may be measured per IEC 61280-1-3.

Thanks!