



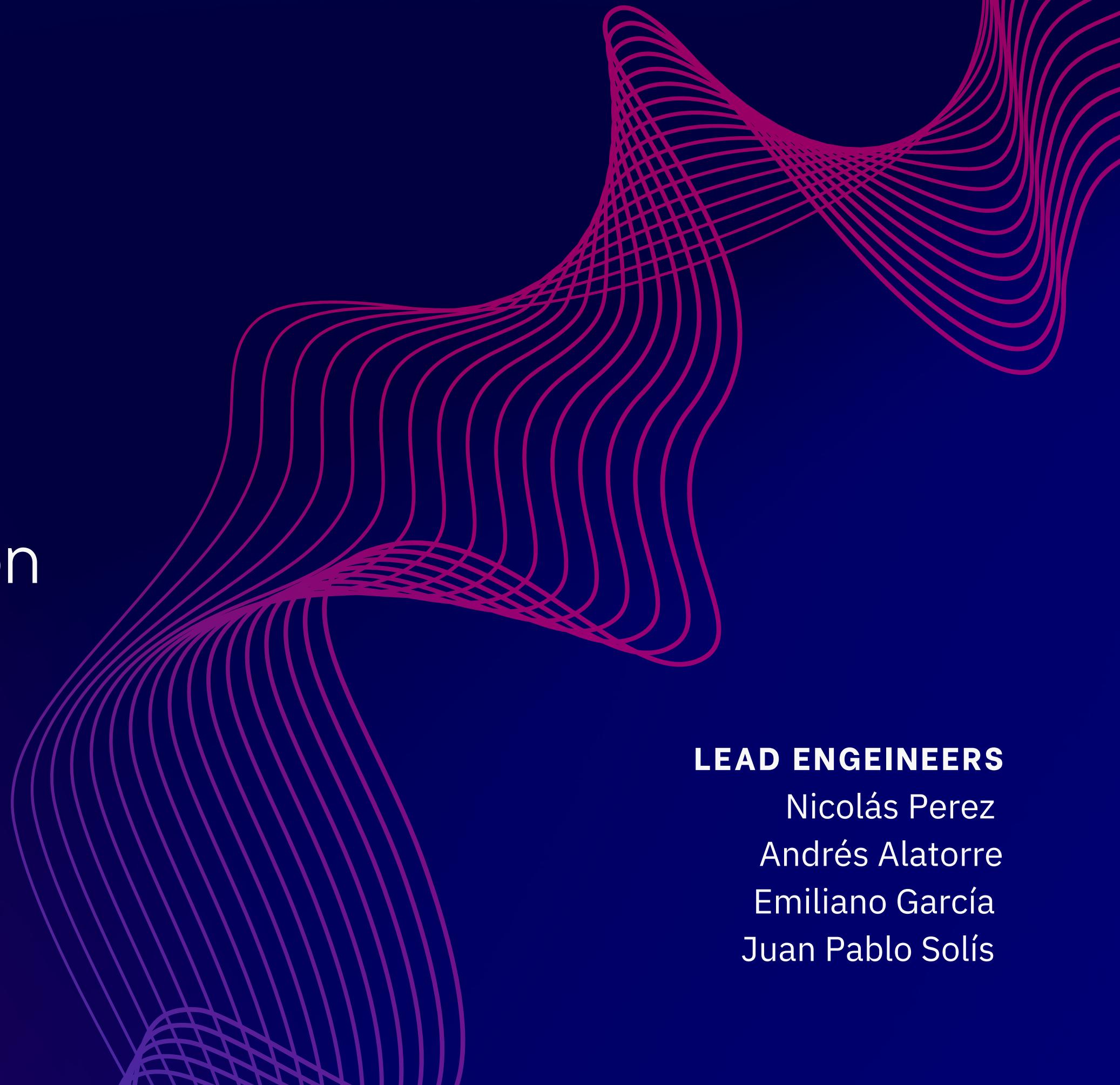
PENDIENTE COMPANY

OPTIMIZATION PROPOSAL

for fiber optic communication
system

for Tec Challenge ®

Mayo 2023



LEAD ENGINEERS

Nicolás Perez
Andrés Alatorre
Emiliano García
Juan Pablo Solís

Why choose Pendiente Company?

- We are the leading company in pulse design for single-mode optical fibers.
- We have more than 5 weeks of experience in the market.
- We offer precision and cost-effectiveness.
- We quantitatively evaluate the best proposal for your company.

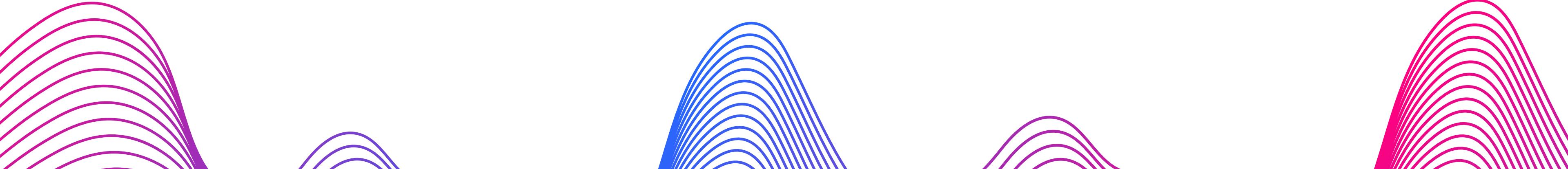
We are the best option to optimize the
Monterrey–Tokyo Network of Tec
Challenge ®



Our Model

$$u(z = 0, t) = \sum_{n=-2}^2 A_n \operatorname{sech}\left[\frac{(t + nq)}{W_n}\right],$$

$$i \frac{\partial u(z, t)}{\partial z} + \frac{1}{2} \frac{\partial^2 u(z, t)}{\partial t^2} + |u(z, t)|^2 u(z, t) = 0.$$





Parameter relations

$$\int_{-\infty}^{\infty} |A \operatorname{sech}\left(\frac{t}{W}\right)|^2 dt = P = \text{constante} \forall z \rightarrow 2A^3W^2.$$

Integrate[(A (Sech[t / W])) ^2, {t, -Infinity, Infinity}]

2 A² W if condition -

$$W = \frac{1}{A}$$

Adimensional Distance

$$z = \frac{z_{real}}{Ld}, \quad L_d = \frac{T_0^2}{|\beta_2|}.$$

$$T_0 = 10, |\beta_2|, z_{real} = 10800$$

$$L_d = \frac{100}{0.25} = 400$$

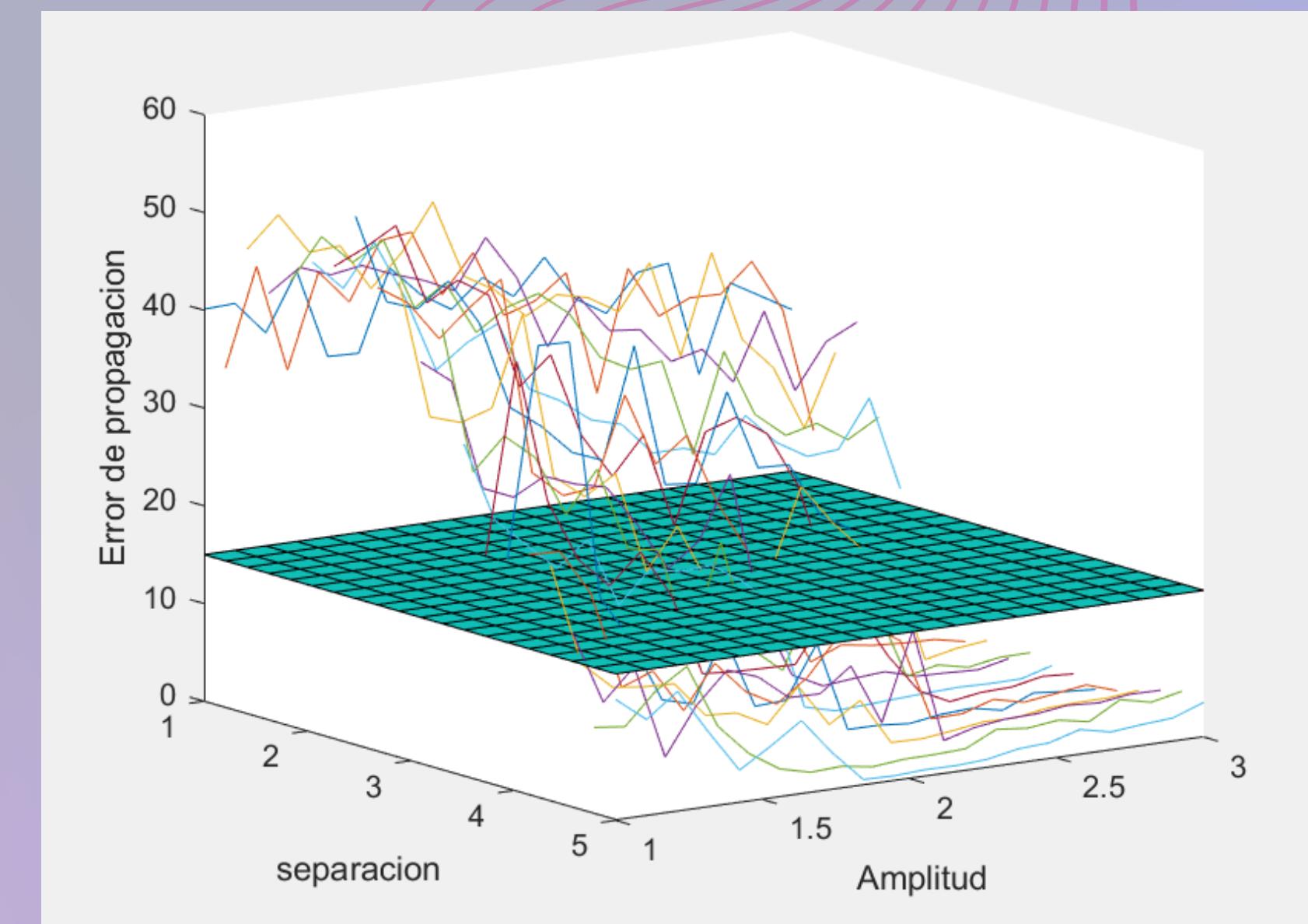
$$z = \frac{10800}{400} = 27$$

Parameter Adjustments

$$\left. \begin{array}{l} B = \frac{1}{qTo} \quad A^2 = \gamma L_d U^2 \\ B > 20 \text{Gb/s} \quad \gamma = 4.5 \text{ W}^{-1}/\text{Km} \\ U^2 = 5 \text{ mW} \end{array} \right\} \begin{array}{l} B = 20 \text{Gb/s} \\ q_{max} = 5 \\ A_{max} = 3 \end{array}$$

OPTIMIZATION 3D PULSE CORRECT®

of Fiber optic communication system

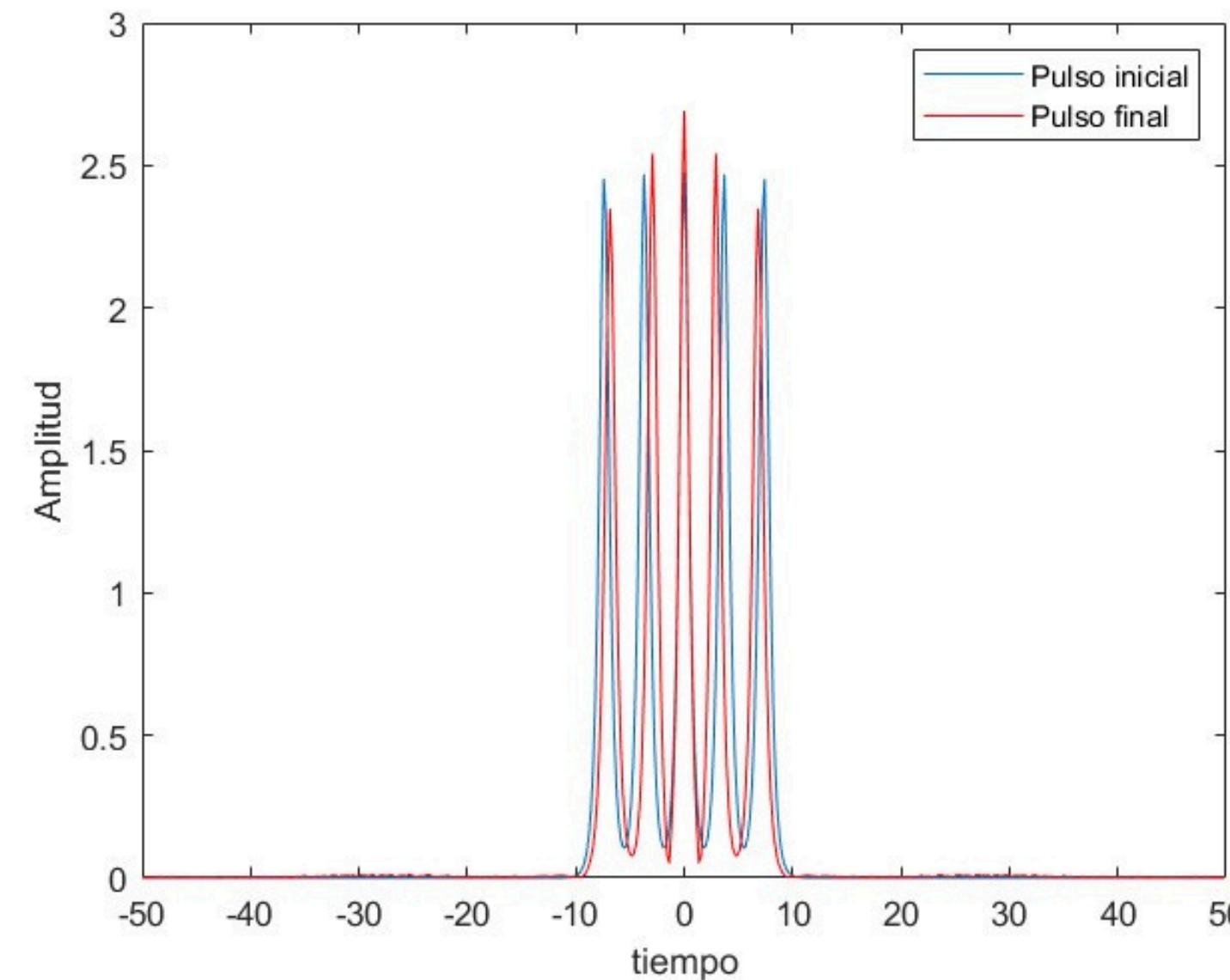
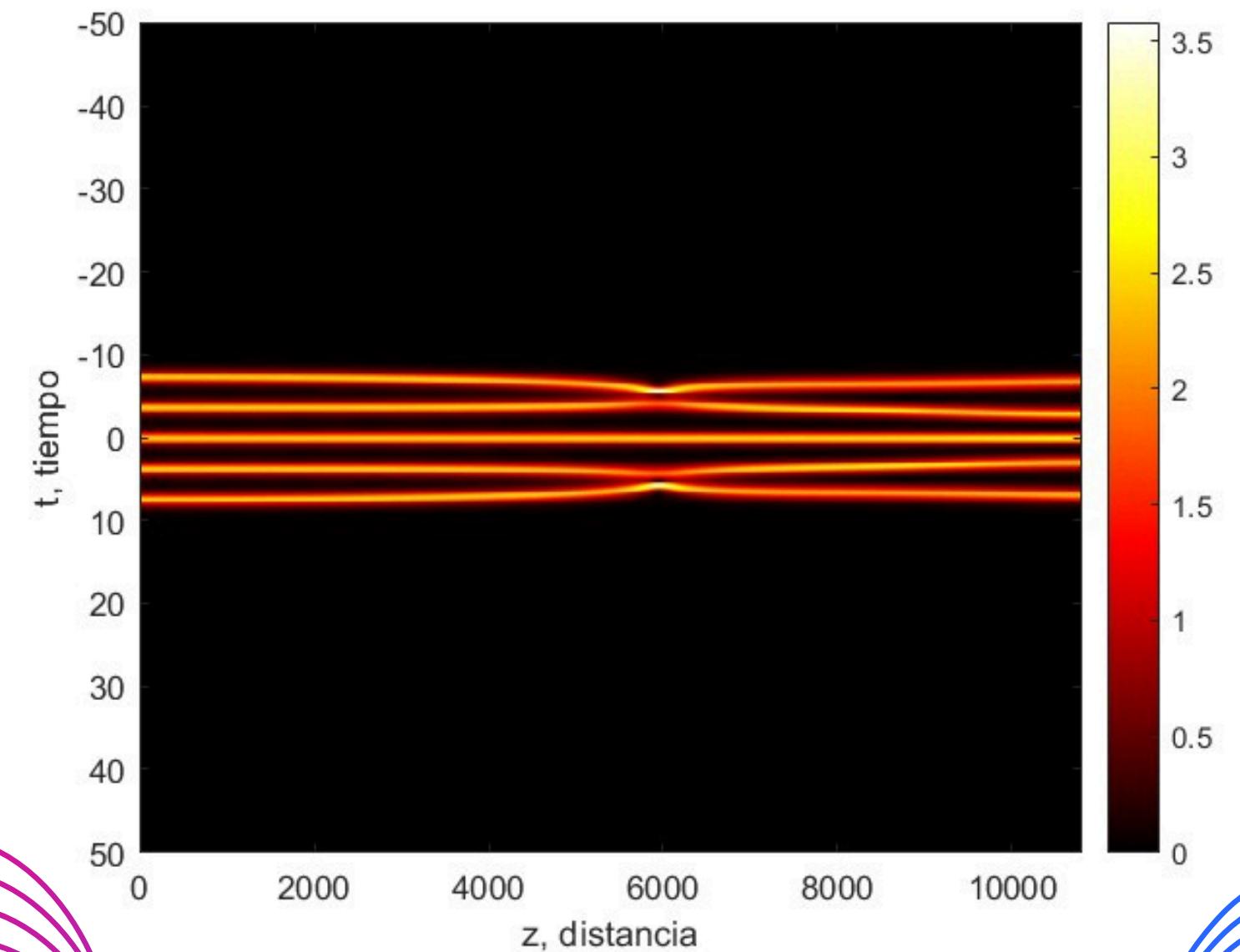




Pendiente



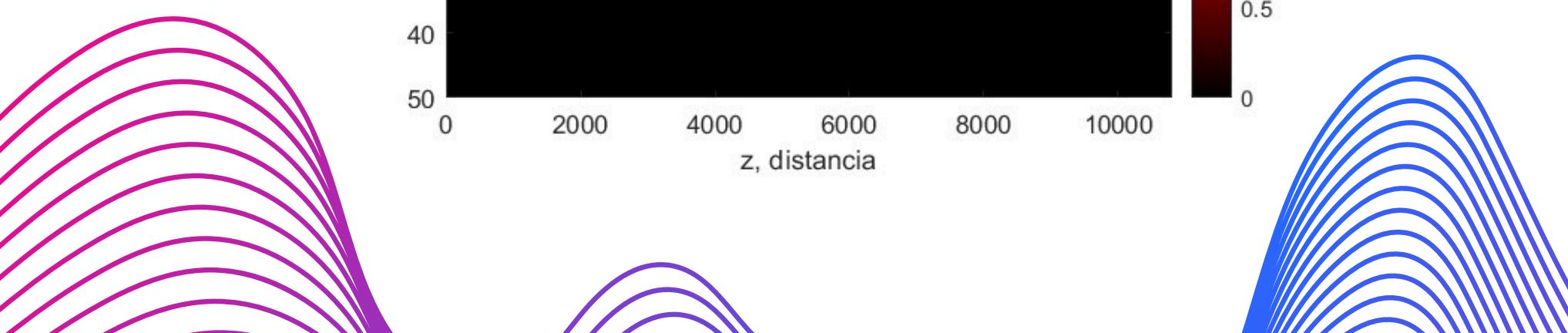
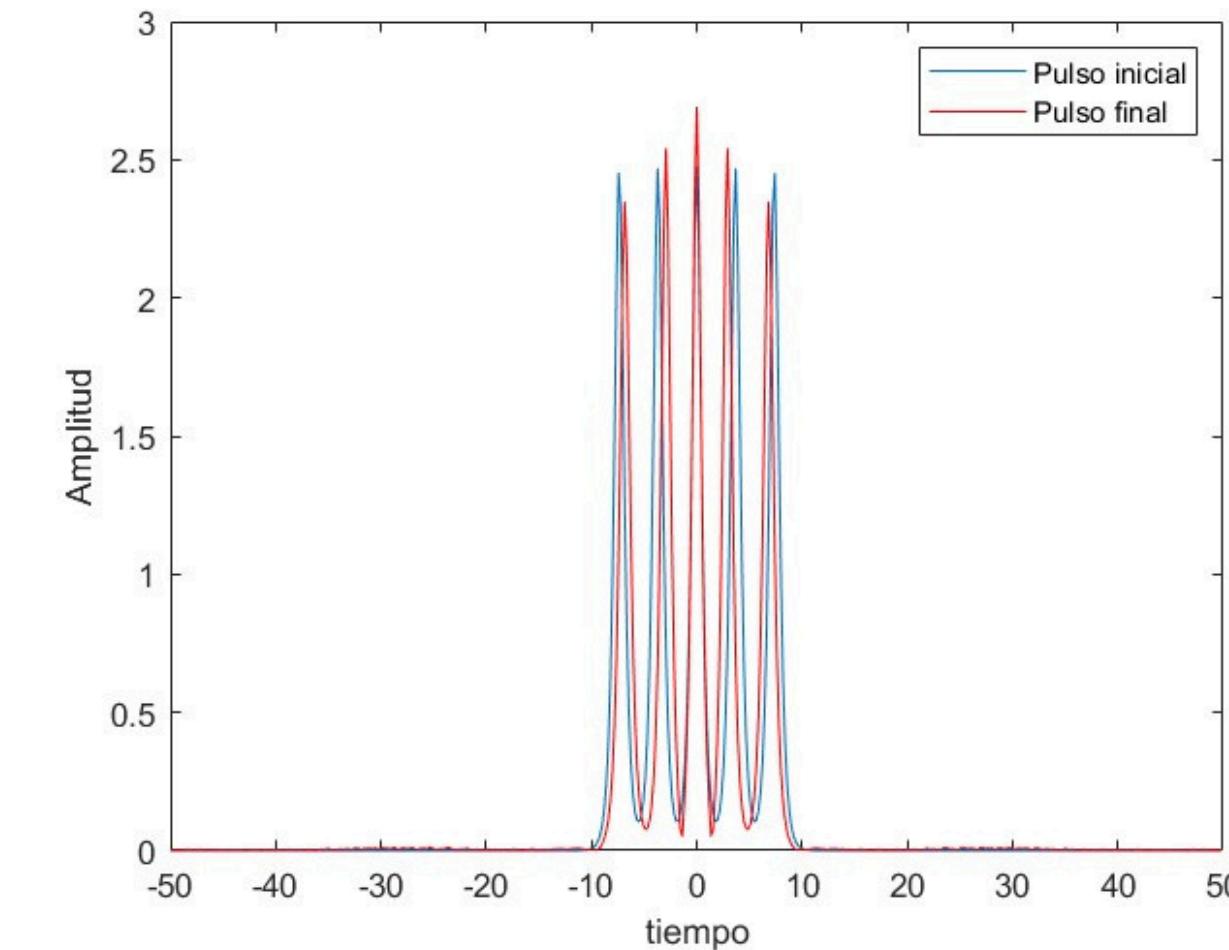
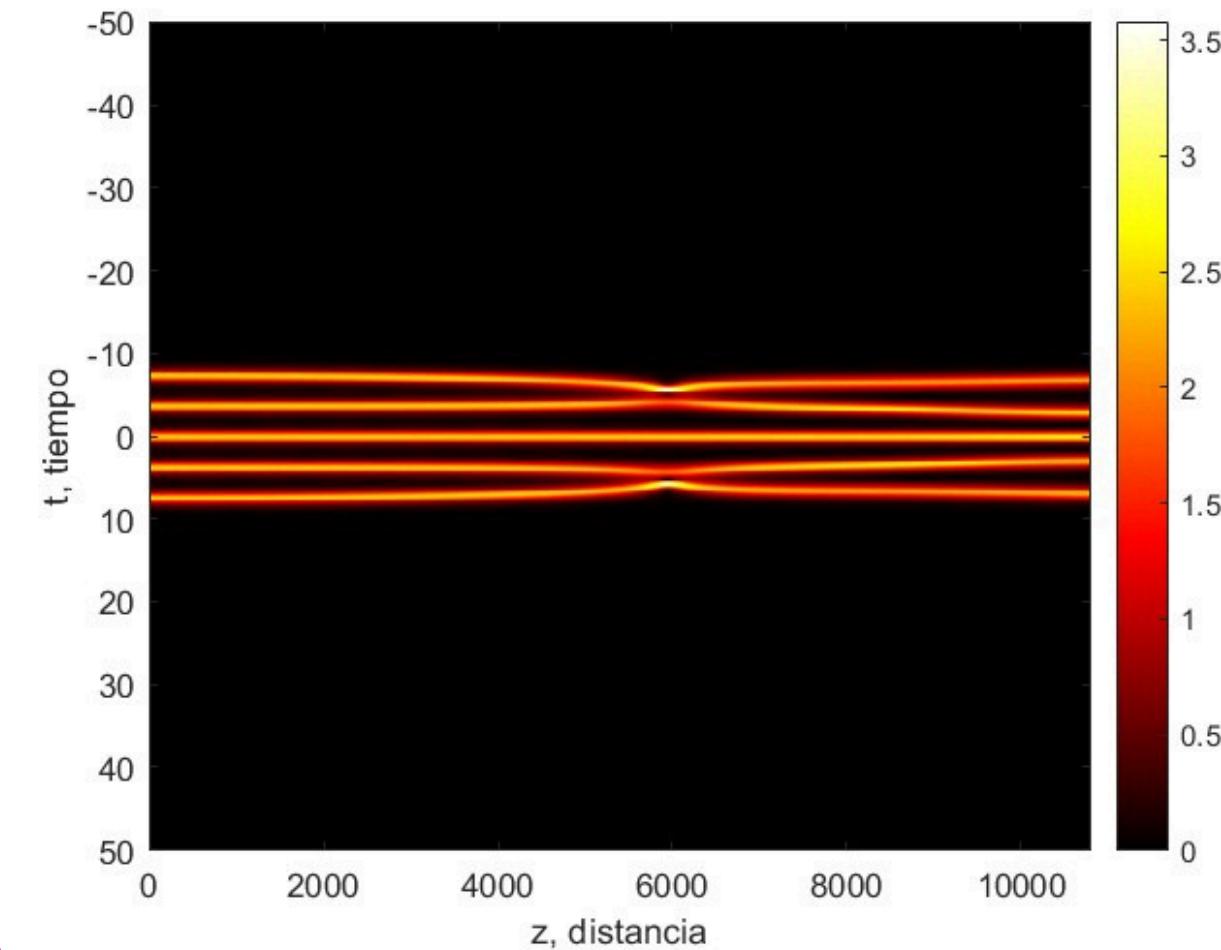
Optipulse/opLink P



Data Optipulse/opLink P



	q	A	B (GB/s)	Potencia (mW)
Optipulse/opLink P®	3.684210526315789	2.473684210526316	27.14285714285714	3.39951 < 5



Error metric

MAXIMUMS

0	0.366171795498336	0.144897458337868	2.817939857970400	8.582840795352494
0	0.121269022505104	1.317208458218359	2.411608443072320	2.763916592300273
0	0.121269022498461	1.317208458273213	2.411608442767547	2.763916591266225
0	0.791497898357857	2.930443807430698	1.288821457825750	4.049933479585358
0	0.791497898348853	2.930443807484793	1.288821456502957	4.049933480441284

1

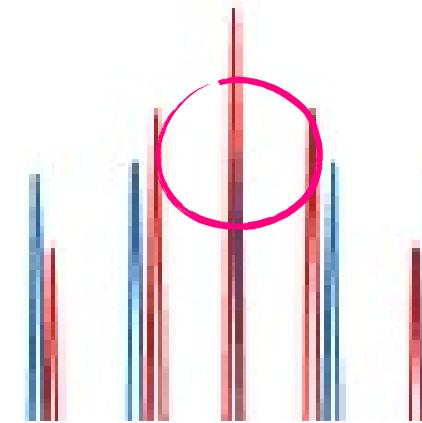
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3

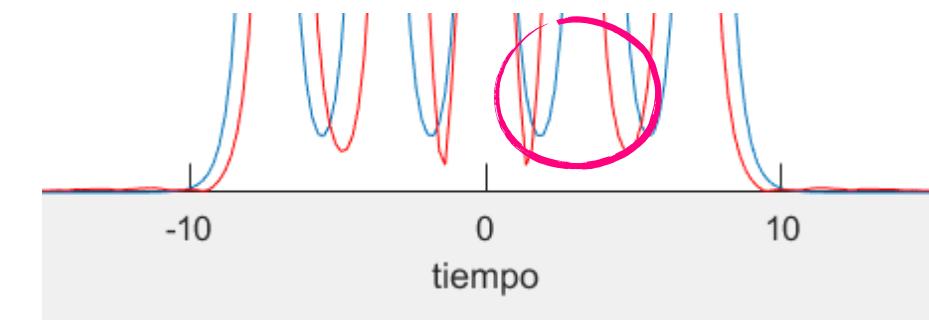
4

5

Amplitude error



Error metric



Phase error

MAXIMUMS

0	0	0	0	0
0	0	0.7568	2.0000	<u>2.0000</u>
0	0	0.7179	1.8974	1.8974
0	1.9481	1.8182	0.5455	0.5455
0	2.0000	1.8667	0.5600	0.5600

①

②

③

④

⑤



Pendiente

Optimización Presupuestal

Principales costos de la Red Mty-Tokio

Installation - \$ 500 M USD

Maintenance- \$ 100 k USD annually

Energetic costs- **\$ 1.8M USD** annually
vs **\$ 2.7M USD** annually*

Consumo Electrico 1 Fibra		
Miliwatts / s (mW)	3.39	5
Kilowatts / s (kW)	0.00000339	0.000005
Kilowatts / hr (kWh)	0.012204	0.018
MXN / kWh (CFE 2021)	\$3.50	\$3.50
MXN / hr	\$0.04	\$0.06
MXN / dia	\$1.03	\$1.51
MXN / año	\$374.17	\$551.88
USD / año	\$18.71	\$27.59

Consumo Electrico N Fibras		
Cantidad fibras	100000	100000
USD / año	\$1,870,873.20	\$2,759,400.00

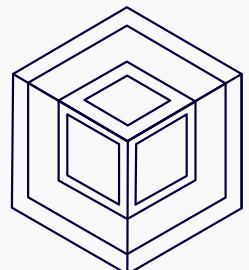
*Contemplating:
\$3.5 MXN / kWh (CFE 2021)
100,000 installed fibers



4 Simple Reasons to choose *Optipulse* of Pendiente Company

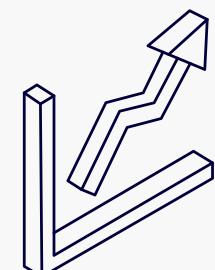
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Precision
from 20% to <8.5%
error



2

Red velocity
from 20 to 27 GB/s



3

Costs reduction
from \$2.7M to \$1.8M
USD



4

**Constant efficiency
evaluation**



Let's connect Asia and LATAM in the fastest,
most **economical, and most efficient** way
possible.

Thanks.



Pendiente Company

Sales Manager

+81 1234 5678

