

DATA: TRANSFER AND STORAGE

OFFICE/CAMPUS SETUP

TRANSFERRING DATA

- END CLIENTS E.G. PC
- RJ45 SWITCH
- FSP AND QFSP



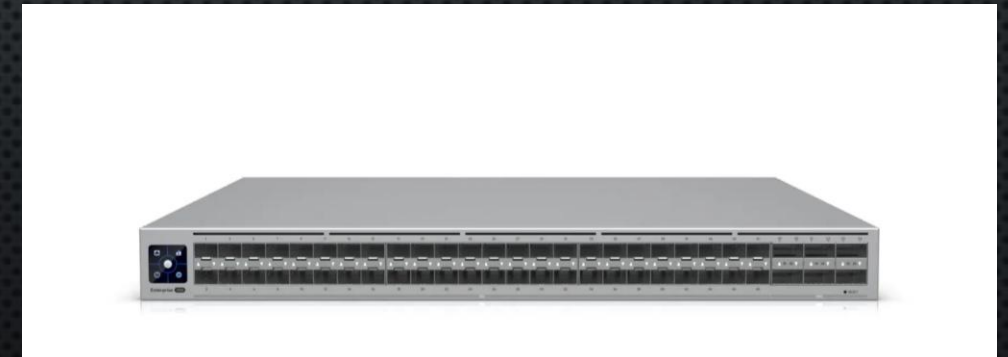
office pc



Fibre Transceiver



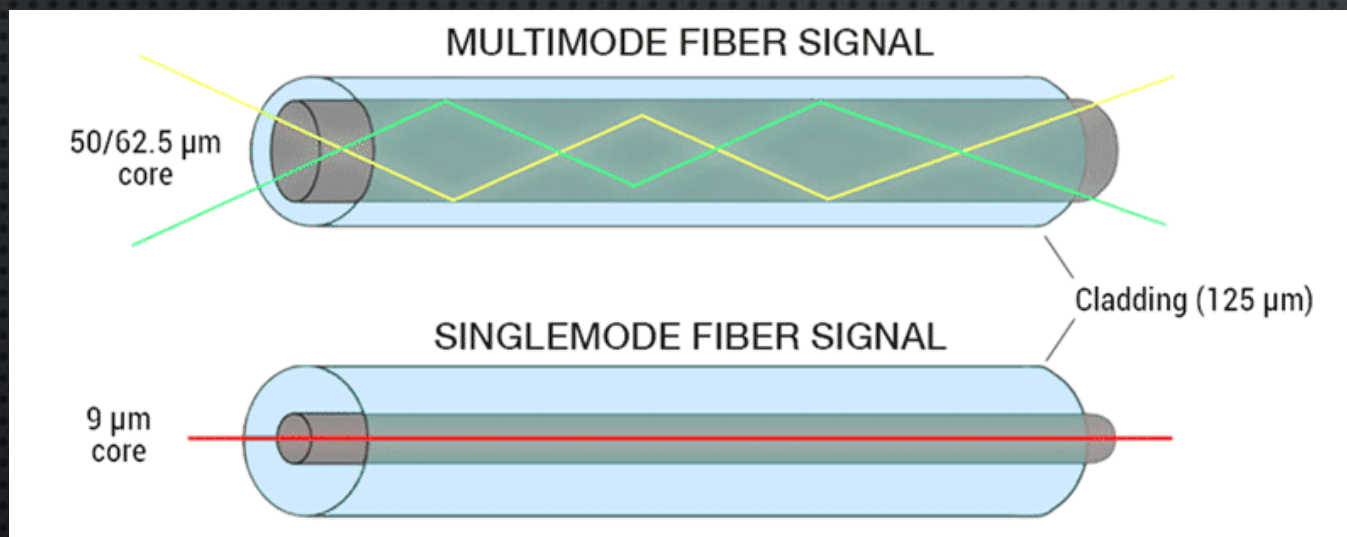
Gigabit Switch



High Speed Switch

OFFICE/CAMPUS SETUP

TRANSFERRING DATA



Single vs Multimode Fibre

Product picture		
Product name:	40Gbps 850nm 100M QSFP+ optical module	40Gbps CWDM 10KM QSFP+ optical module
encapsulated type	QSFP+	QSFP+
wave length	850nm	CWDM
CWDM	MPO	LC duplex
Fiber Type	MMF multimode fiber	MMF multimode fiber
Max transmission distance	150m (OM4 multimode fiber)	10km
Laser type	VCSEL	DFB

Transceivers

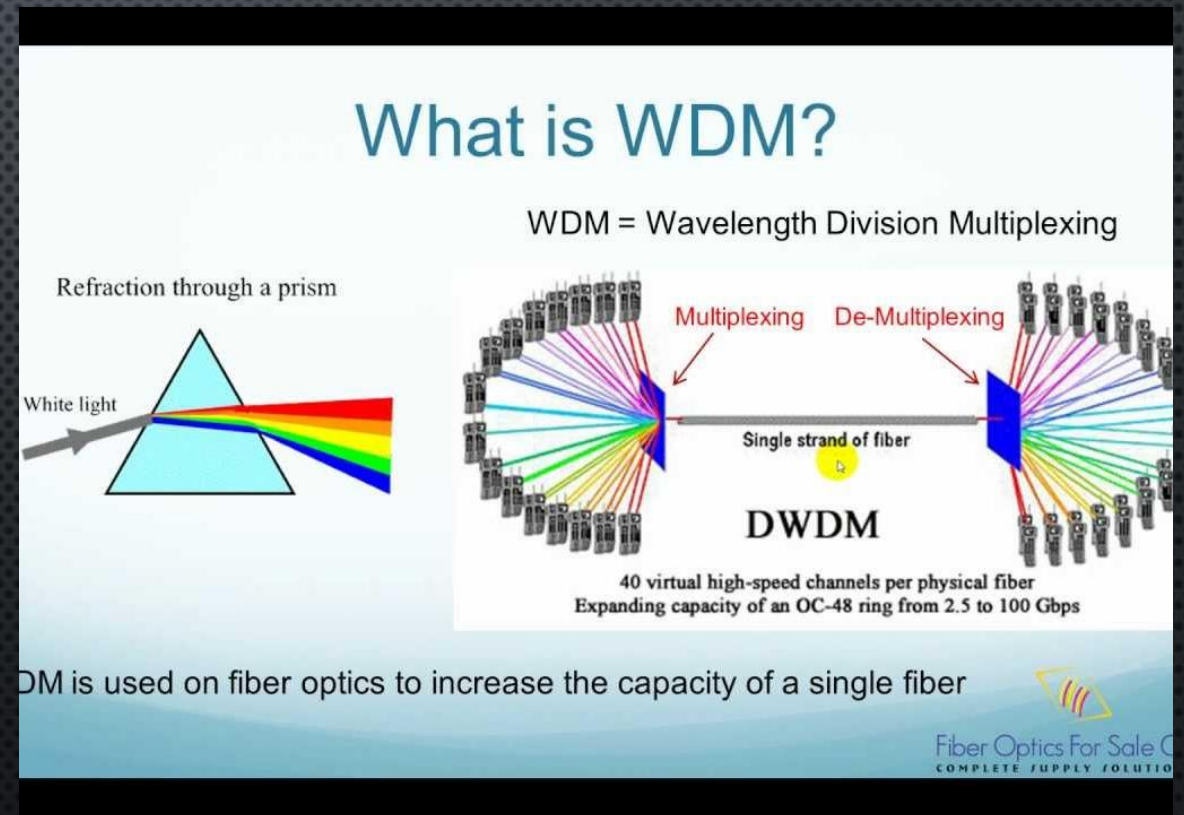
INTERNET

TRANSFERRING DATA

- REMEMBER MULTIPLEXING?
- ALLOWS HUGE INCREASE IN DATA TRANSFER DOWN SINGLE PATH
- USES OPTICS INSTEAD OF ELECTRONICS
- CAN BE SET UP AND UTILISED LATER WITHOUT GREAT EXPENSE

What is WDM?

WDM = Wavelength Division Multiplexing



Refraction through a prism

White light

Multiplexing De-Multiplexing

Single strand of fiber

DWDM

40 virtual high-speed channels per physical fiber
Expanding capacity of an OC-48 ring from 2.5 to 100 Gbps

WDM is used on fiber optics to increase the capacity of a single fiber

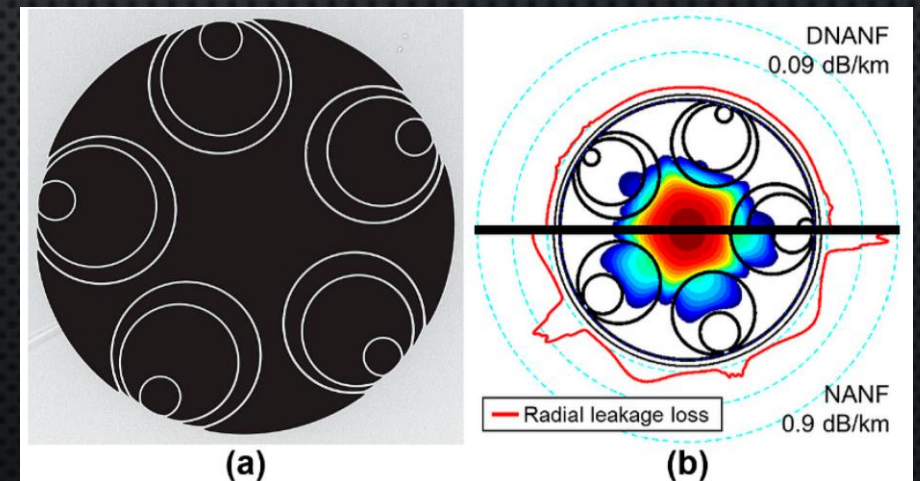
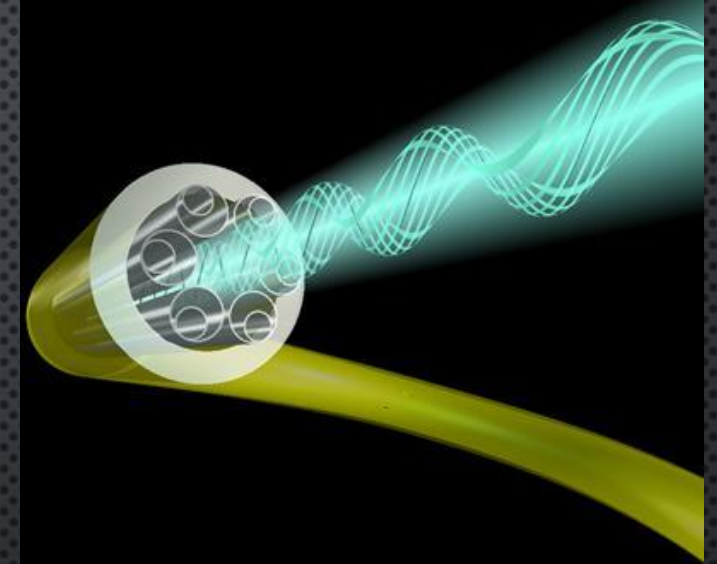
Fiber Optics For Sale C
COMPLETE SUPPLY SOLUTION

Caption

HCF

TRANSFERRING DATA

- BUT WHAT IF 186,000 MILES PER SECOND IS A BIT.... SLOW.
- FIBRE OPTICS BOUNCE LIGHT
- REFRACTIVE INDEX OF GLASS IS AROUND 1.5
- $3 \gg 2 \times 10^8 \text{ ms}^{-1}$ (SUBSCRIPT WONT WORK)
- USE AIR INSTEAD

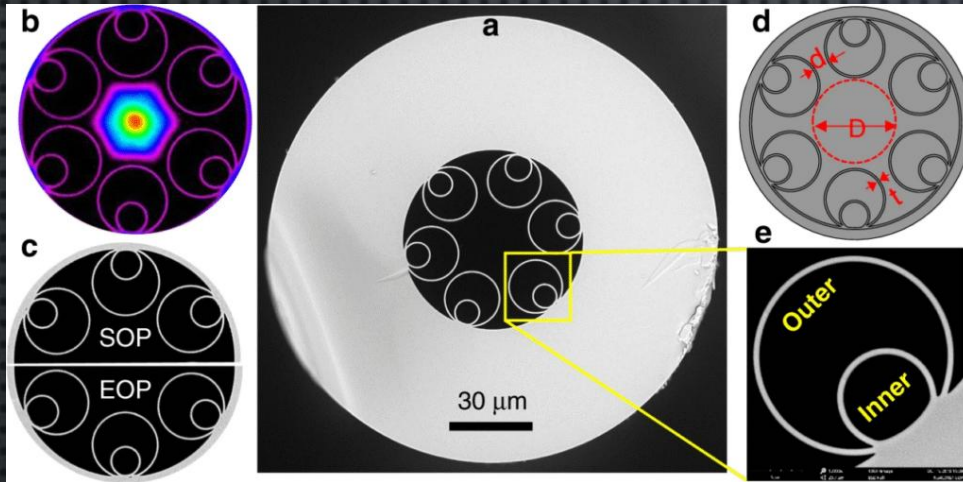


light travels through the air inside the fibre, not the glass

HCF

TRANSFERRING DATA

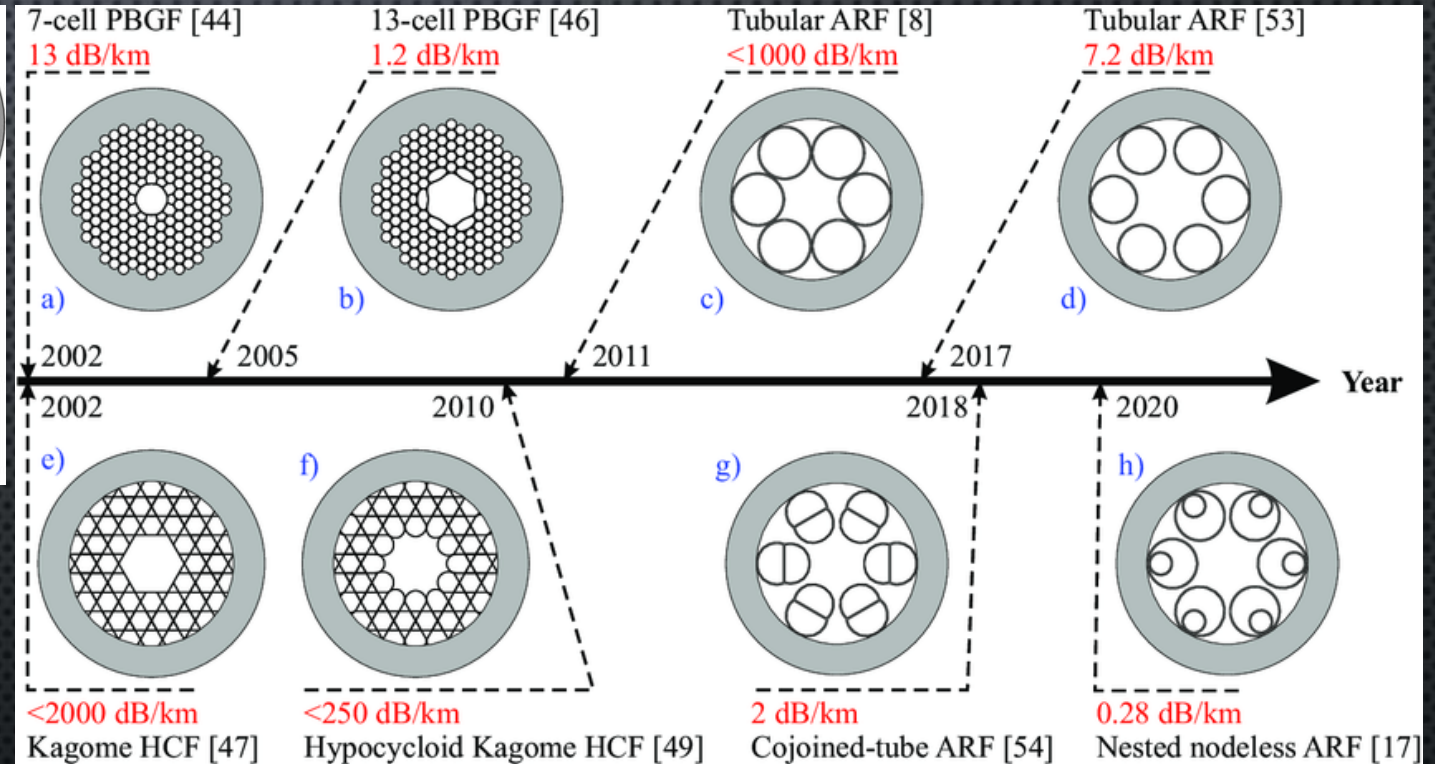
0.2dB/km = 4.5% loss per km



ATTENUATION BENCHMARKS:

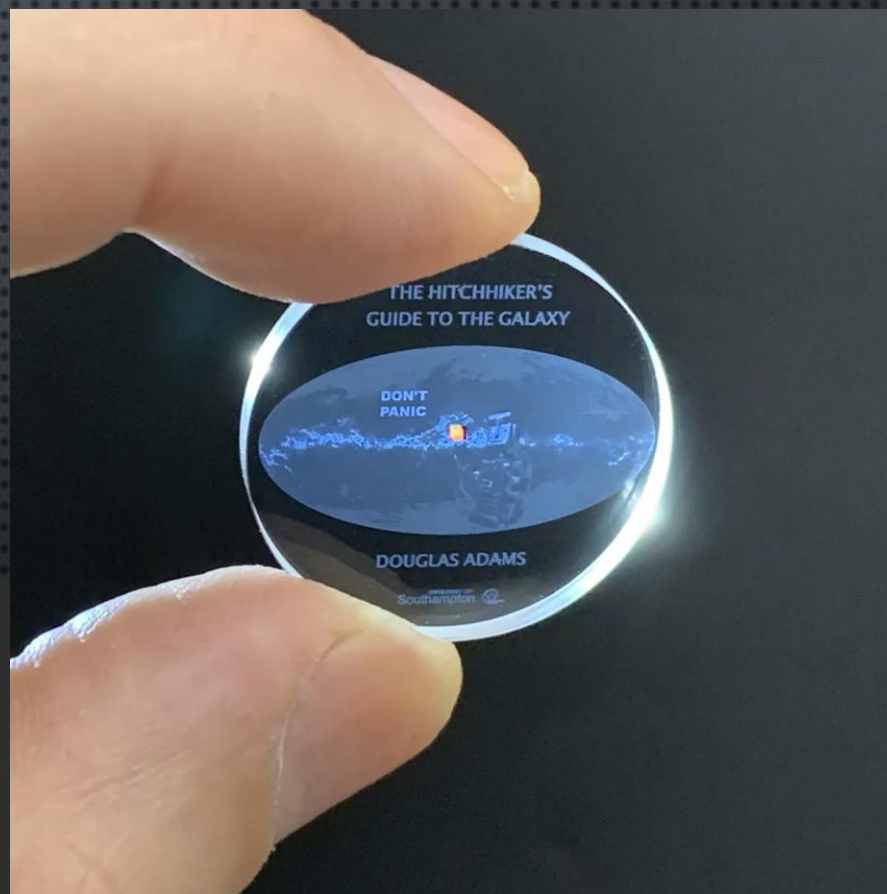
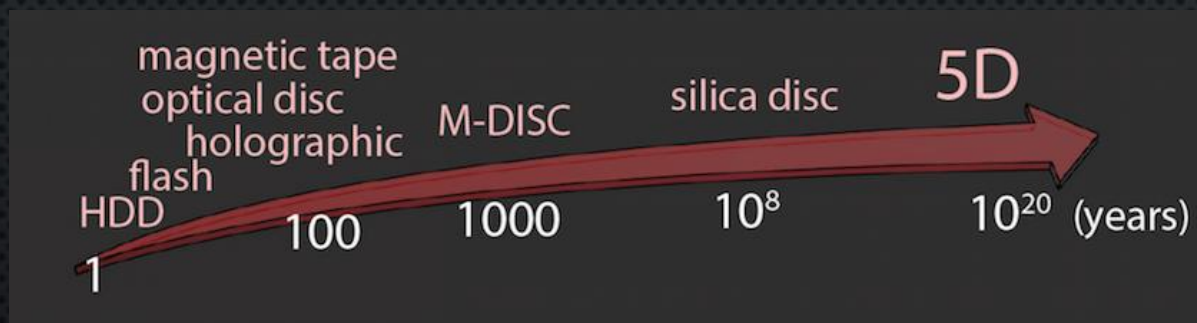
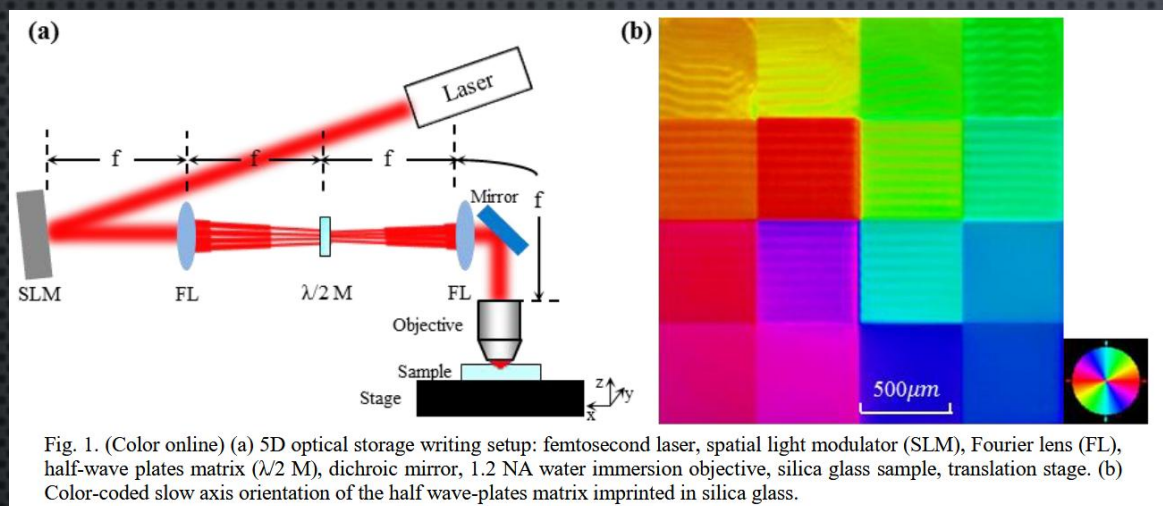
SMF (1550 nm) $\approx 0.16\text{--}0.2$ dB/km;

HCF (CURRENTLY) $\lesssim 0.2\text{--}0.3$ dB/km
(TARGET ~ 0.1 dB/km).



5D STORAGE

STORING DATA



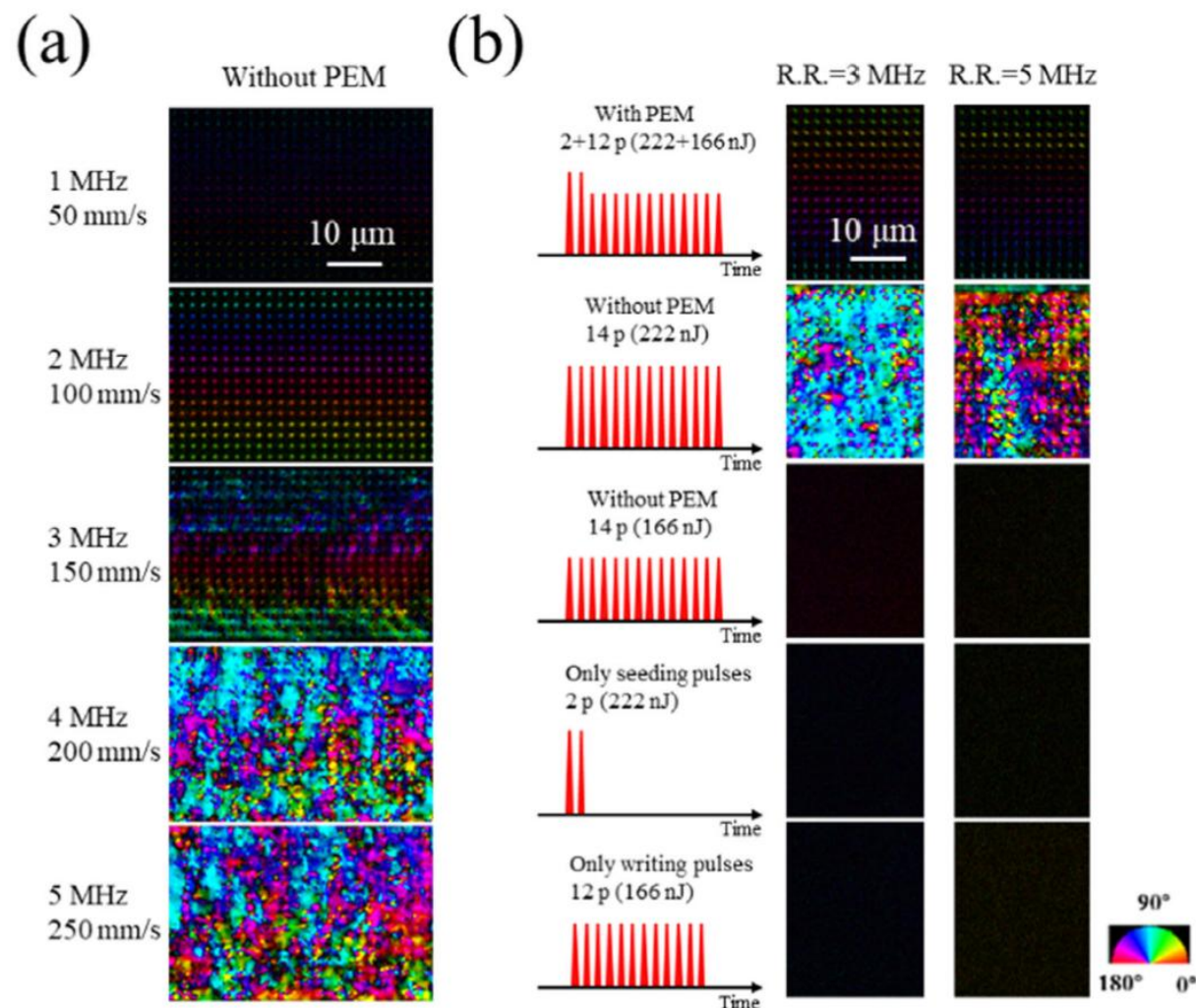
5D STORAGE

STORING DATA

Hexadecimal to Binary Table



Hexadecimal (Base 16)	Binary (Base 2)	Hexadecimal (Base 16)	Binary (Base 2)
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111



IDEAS

DATA

- STRATEGY/RTS
- MANAGE A NETWORK, POSSIBLY WIDE AREA COMMUNICATION
- EVOLVE OVER TIME, INCREASING DEMANDS
- ELECTRICAL POWER COST INCREASE
- SPACE CONSTRAINTS
- PROFFIT MARGIN LATE GAME — SID MEIER'S CIVILISATION STYLE OPPONENT - COMPANIES FORCE PRICE DOWN
- LOCATION/INFRASTRUCTURE-BASED PRICING — ISP AND TELECOMS BUSINESS MODEL