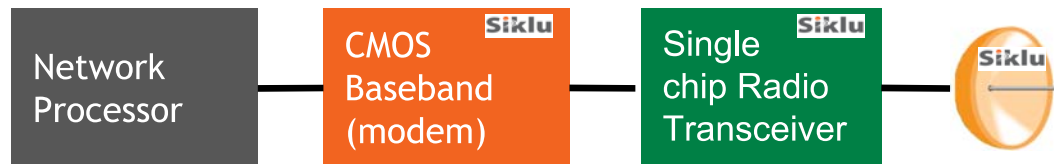


Siklu EtherHaul E-band Solutions

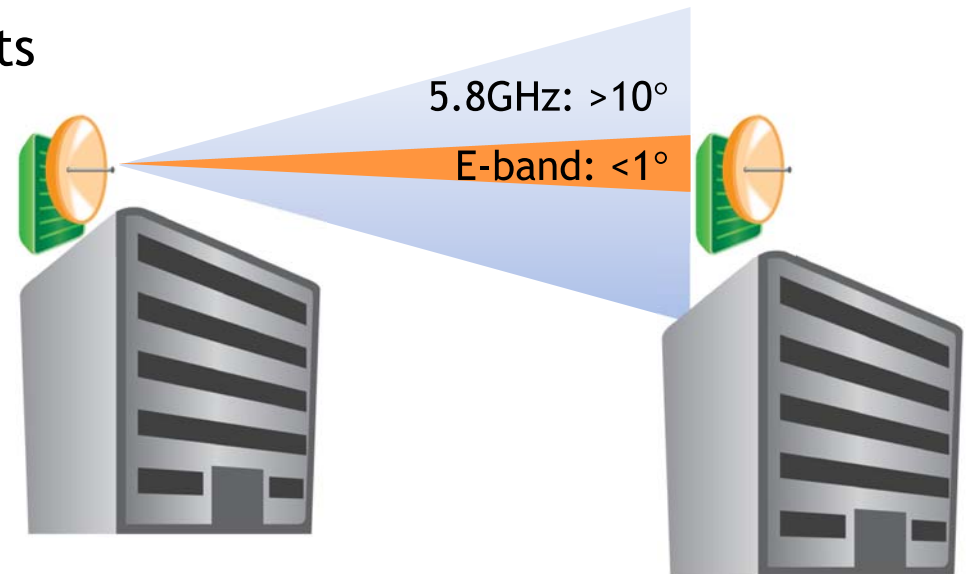


- HQ in Israel
- 50 Employees
- First to offer a fully integrated silicon E-band solution

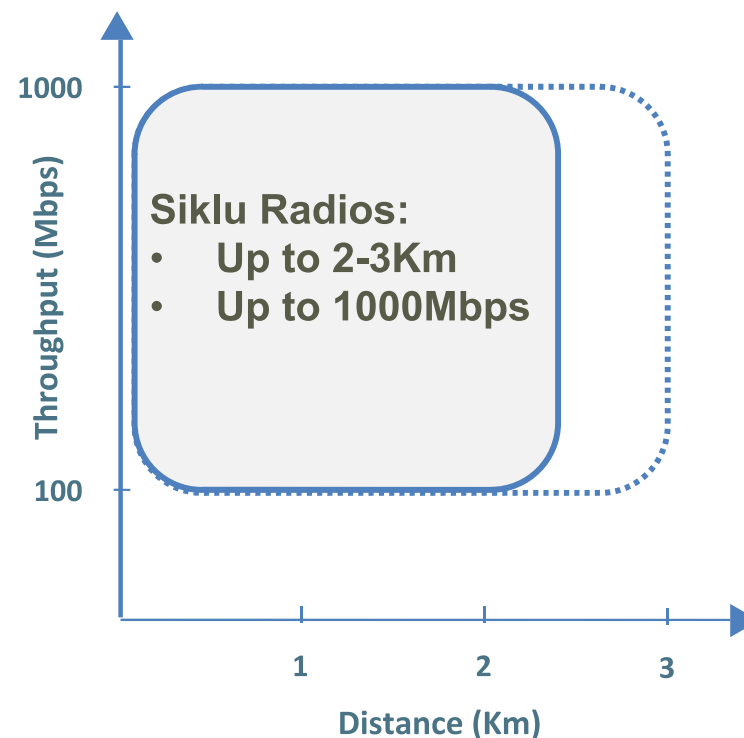


- 30 Pending patents
- First product launched: 2011
- Links shipped:
 - ▣ 2011: 1000 links
 - ▣ 2012: 1700 links (#1 E-band vendor in number of links shipped)

- What is E-band:
 - ▣ 10GHz of spectrum: 71-76GHz and 81-86GHz
 - ▣ Requires Line of Sight
- Advantages of E-band over traditional microwave bands:
 - ▣ Large spectrum \Rightarrow Gigabit throughputs
 - ▣ Uncongested
 - ▣ Lightly licensed
 - Protection against interference
 - Simple: register in Ofcom's database
 - ▣ Inexpensive: only £50 per year (UK)
 - ▣ Pencil-beams (beam-width $< 1^\circ$):
 - Good spectral reuse and minimum interference from neighbouring links
 - Secure (hard to detect and intercept)



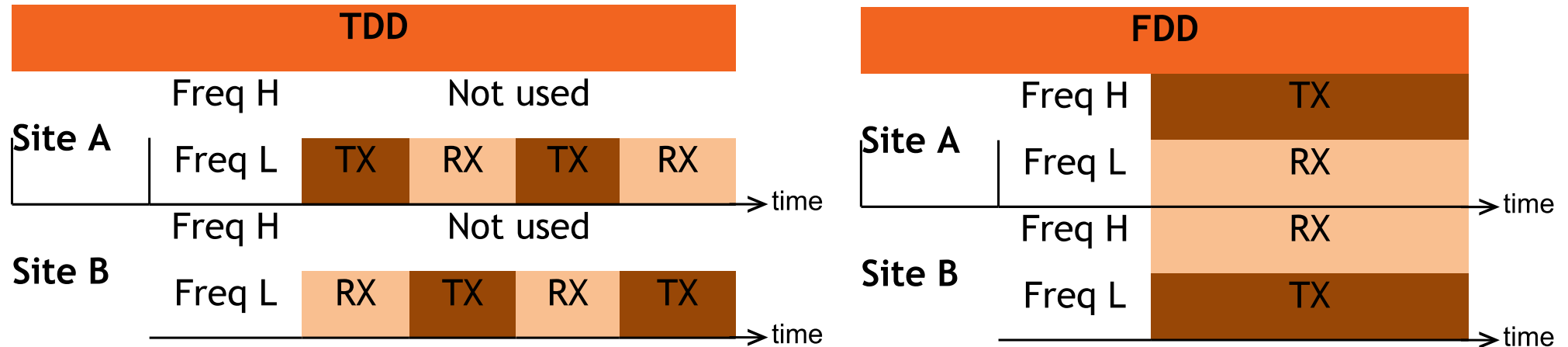
- Point-to-point Ethernet (LAN) Connectivity
- Fiber extension:
 - ▣ Service providers, ISPs
 - Backhaul
 - Last mile
 - ▣ Campuses:
 - Health
 - Education
 - Corporates, businesses
 - ▣ Security:
 - CCTV
 - ▣ Computing:
 - Distributed servers / storage
 - Cloud computing



Max Link Distance: London*

* $R_{0.01\%}$ =30.6mm/h (also indicative of Paris)

		Link Availability			
		Target: 1Gbps @99.99%		Target: 100Mbps @99.99%	
	Throughput	Percentage	Minutes / Year	Percentage	Minutes / Year
1' Antenna		Link: 1,500m		Link: 2,500m	
	1000Mbps	99.991%	Whole year - 49	99.936%	Whole year - 339
	700Mbps	99.996%	26	99.970%	180
	350Mbps	99.998%	13	99.985%	80
	80Mbps	>99.999%	5	99.991%	31
	20Mbps	>99.999%	2	99.994%	18
	Link Down		2		30
2' Antenna		Link: 2,000m		Link: 3,000m	
	1000Mbps	99.992%	Whole year - 40	99.970%	Whole year - 159
	700Mbps	99.996%	17	99.982%	64
	350Mbps	99.998%	11	99.989%	39
	80Mbps	99.999%	5	99.993%	19
	20Mbps	>99.999%	3	99.995%	12
	Link Down		4		25



- **FDD:**
 - **Throughput:** FDD offers twice the throughput of TDD (same £50 license fee)
- **TDD:**
 - **Cost:** TDD is less expensive than FDD
 - **Inventory:** TDD simplifies inventory: only one type of radio
 - **Symmetry:** TDD offers asymmetric throughput allocation:
 - 50%/50%, 75%/25%, 90%/10%
 - Ideal for applications where downlink > uplink (CCTV, ISP, mobile backhaul)

Product	Throughput	Ports	Optional Licensing
EH1200 T -L	700Mbps HD	2	<ul style="list-style-type: none"> • Encryption (128/256-AES)
EH1220 T EH1220 F	1000Mbps HD 1000Mbps FD	2 4	<ul style="list-style-type: none"> • Encryption (128/256-AES) • Capacity (100/200/500/1000Mbps) • Synchronization (SyncE, 1588TC) • OAM & Ethernet Ring Protection

All Siklu's Radios offer:

- Hitless (errorless) adaptive modulation & coding
- Advanced Layer-2 features:
 - ▣ Provider Bridge (VLAN, Q-in-Q)
 - ▣ Quality of Service, SLA
 - ▣ MEF 9, 14 Compliance
 - ▣ Low latency ($\sim 350\mu s$)
- Spectrum efficiency: QPSK to 64QAM (16QAM in .
- 1' or 2' antennas
- Integrated silicon solution:
 - ▣ Small footprint
 - ▣ High MTBF (>70 years)
 - ▣ Low power consumption and PoE (power-over-Ethernet)



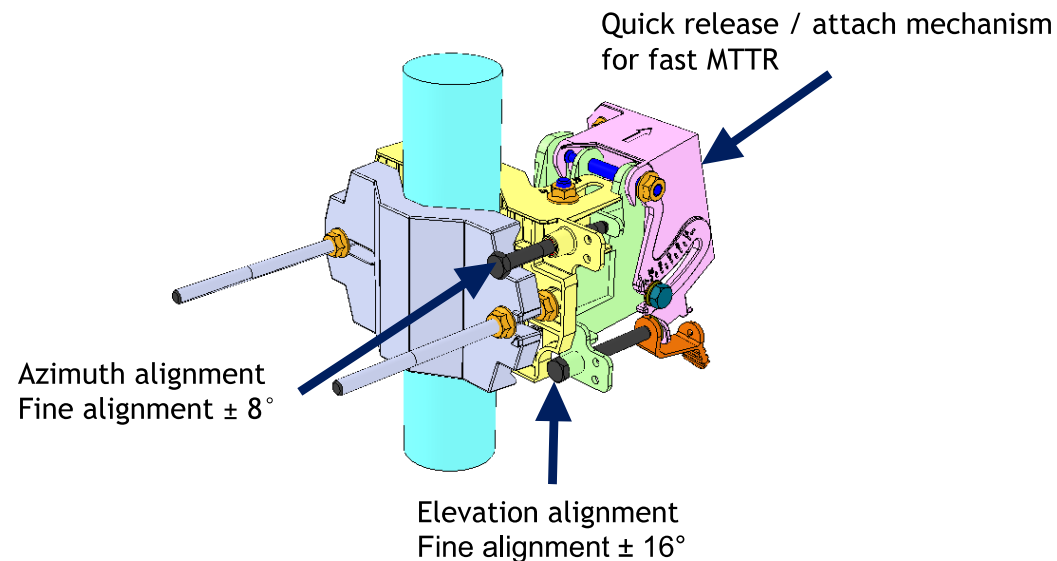
- Inexpensive!
Fibre deployment costs are very expensive:
 - ▣ In cities:
 - If ducts exist: £50/metre
 - If duct does not exist: £100/metre
 - ▣ Rural: £20/metre
- Fast deployment - can be up and running in a day
- Own infrastructure
- No disruptions due to road maintenance

EH1200T Dimensions and Weights

Form Factor		All-outdoor	
Dimensions	ODU (H x W x D):	24.5 cm x 22.5 cm x 5 cm	(9.7" x 8.9" x 2")
	Antenna - 26 cm, 10.3" (Dia. x Depth):	26 cm x 10 cm	(10.3" x 3.9")
	Antenna - 31 cm, 12.2" (Dia. x Depth):	31 cm x 11 cm	(12.2" x 4.3")
	Antenna - 65 cm, 25.6" (Dia. x Depth):	65 cm x 37 cm	(25.6" x 14.6")
Weights	ODU+ antenna (26 cm, 10.3"):	3 kg	(6.6 lbs)
	ODU+ antenna (31 cm, 12.2"):	3.5 kg	(7.7 lbs)
	ODU:	2 kg	(4.4 lbs)
	Antenna (26 cm, 10.3"):	1 kg	(2.2 lbs)
	Antenna (31 cm, 12.2"):	1.5 kg	(3.3 lbs)
	Antenna (65 cm, 25.6"):	8 kg	(18 lbs)

“Installer Friendly”

- Extremely light weight:
 - Can be carried up the mast on installers belt saving time and money
- Quick antenna alignment
 - In current trials: the link was installed and aligned in under 15 minutes (following a short training)



Management Concept

- CLI for full configuration and maintenance
- Web-based management interface
- SNMP v.2 and SNMP v.3 - configuration, monitoring and northbound

```

COM1:115200baud - Tera Term VT
File Edit Setup Control Window Resize Help

default>show rf

rf operational           : up
rf tx-state              : normal
rf rx-state              : normal
rf cinr                  : 19
rf rssi                  : -43
rf ptx                   : 5
rf channel-width         : 500
rf frequency             : 74000
rf role                  : master
rf role-status           : master
rf mode                  : adaptive qpsk 4 1 0.5
rf alignment-status      : inactive
rf lowest-modulation     : qpsk 1 4 0.5
rf tx-asymmetry          : 50tx-50rx
rf rx-link-id            : 0
rf tx-link-id            : 0
rf temperature           : 52
  
```





Small Cell Backhaul

www.siklu.com

EH600 (60GHz)



60GHz

- Unlicensed
- Small form factor
- Up to 300-500m
- Ideal for small cell backhaul



Interfaces

- Data Interfaces:
 - ▣ 2 x 100/1000Base-T RJ45 (1, 3)
- Auxiliary Interfaces:
 - ▣ Local craft management USB (2)
 - ▣ Reset button (7)
 - ▣ RSSI DVM probes connectors (6)
 - ▣ Indication leds (5)

Form Factor	All ODU with integrated antenna
Dimensions	15cm x 15cm x 7.5cm (depth)
Weight	1.5Kg

- The antenna designed to cope with street level installation and overcome lamp post sway, twist and vibration

Diameter	14cm
Gain	32dBi
Beam Width (AZ)	3°
Beam Width (EL)	7°
Polarization	Vertical or Horizontal



THANK YOU

www.siklu.com