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Broadband Performance Testing

Broadband Performance Testing

- Broadband Speed testing, i.a.w. FCC perform testing of speed and latency, proof of quality of service.
- TR-143 is a subsequent report of TR-069 that enables network performance testing of TR-069 compliant CPEs, which defines an Active Monitoring test suite which can be used by ISPs to monitor and diagnose their broadband connections.

TR-143 Broadband Performance Testing includes:

- UDPEchoPlus (Ping/Latency Test)
- Download diagnostics (FTP or HTTP file download)
- Upload diagnostics (FTP or HTTP file upload)

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Broadband Performance Testing - Requirements

Broadband Performance Requirements:

NBN services that use the existing copper network where there are rules for speed tests.
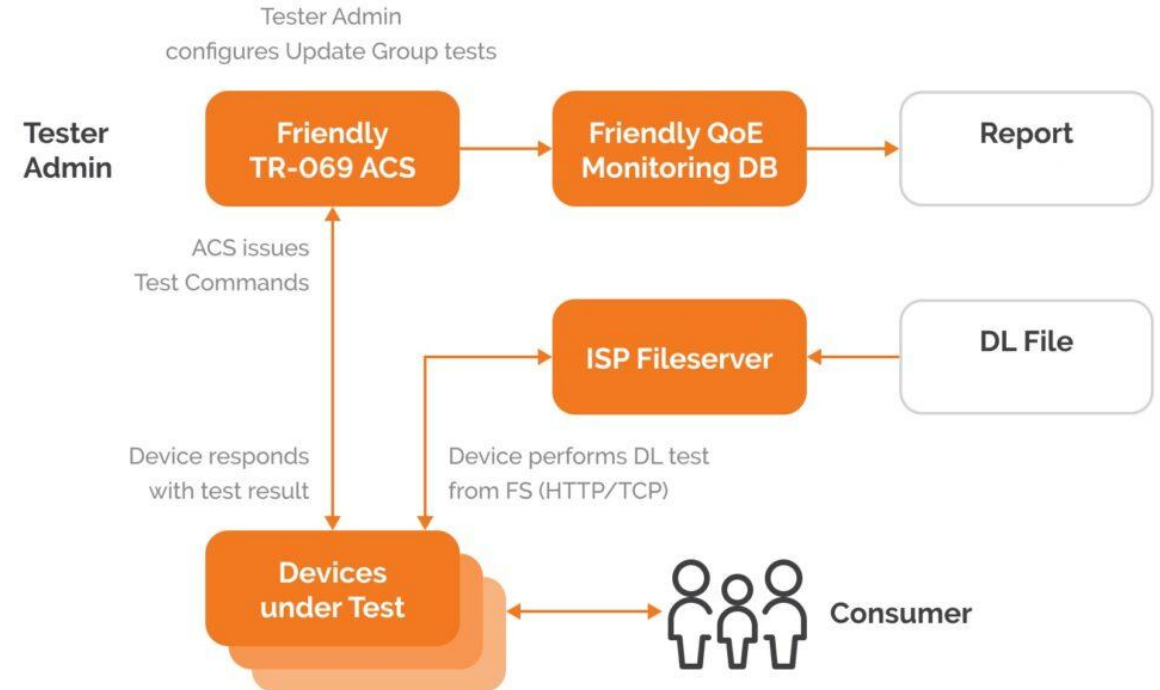
The telco must let consumers know:

- The speeds their connections can achieve.
- That consumers can exit their contracts at no cost if the ISP can't deliver the speeds advertised.
- That there is no cost to consumers to move to a lower speed plan at a lower price, which reflects the speeds that an ISP can achieve.

ISP Testing Requirements:

- Sample of Devices from various CVCs, CSAs, POIs, and Access Technology Types (FTTP, FTTB, FFTC, FTTN, HFC, Wireless).
- Sample of Devices in each Speed Plan (e.g. 100/50/25/12 Mbps) to be tested.
- Speed & latency tests during peak periods.
- Speed & latency tests during off peak periods.
- Reporting averages per test hour per speed plan.
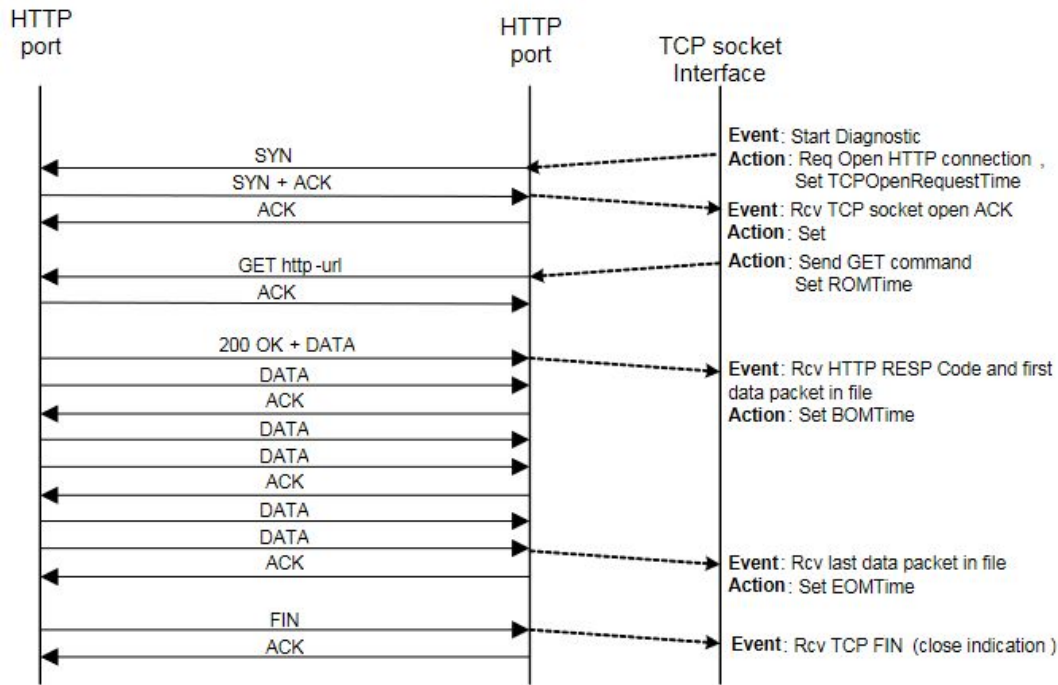- Reporting low & high percentiles for speed and latency tests.

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Performance Testing - Setup

- **Selection** of devices registered on the ACS.
- TR-069 ACS configures **Update Group** testing for all selected devices.
- Tests are **Batched** (spread) over 1hr to reduce peak network & server load.
- TR-069 **ACS issues command** to device to perform Download/Upload/Latency (DL/UL/Ping) Test.
- Fielded **devices perform the physical DL/UL/Ping test** from/to Server, and report the start time, end time and downloaded bytes to the ACS.
- Time series **Results are captured and stored** in the QoE Monitoring database.

Tester Admin configures Update Group tests

Tester Admin

Friendly TR-069 ACS

Friendly QoE Monitoring DB

Report

ACS issues Test Commands

ISP Fileserver

DL File

Device responds with test result

Device performs DL test from FS (HTTP/TCP)

Devices under Test

Consumer

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Performance Testing - Process

Download Diagnostics (HTTP transport)

Above Socket (HTTP)	Socket Layer	Below Socket
EOMTime	ROMTime	TotalBytesReceived (Ethernet)
	BOMTime	EthernetPriority (Ethernet)
	TCPOpenRequestTime	DSCP setting (IP)
	TCPOpenResponseTime	
	TestBytesReceived	

Upload Diagnostics (HTTP transport)
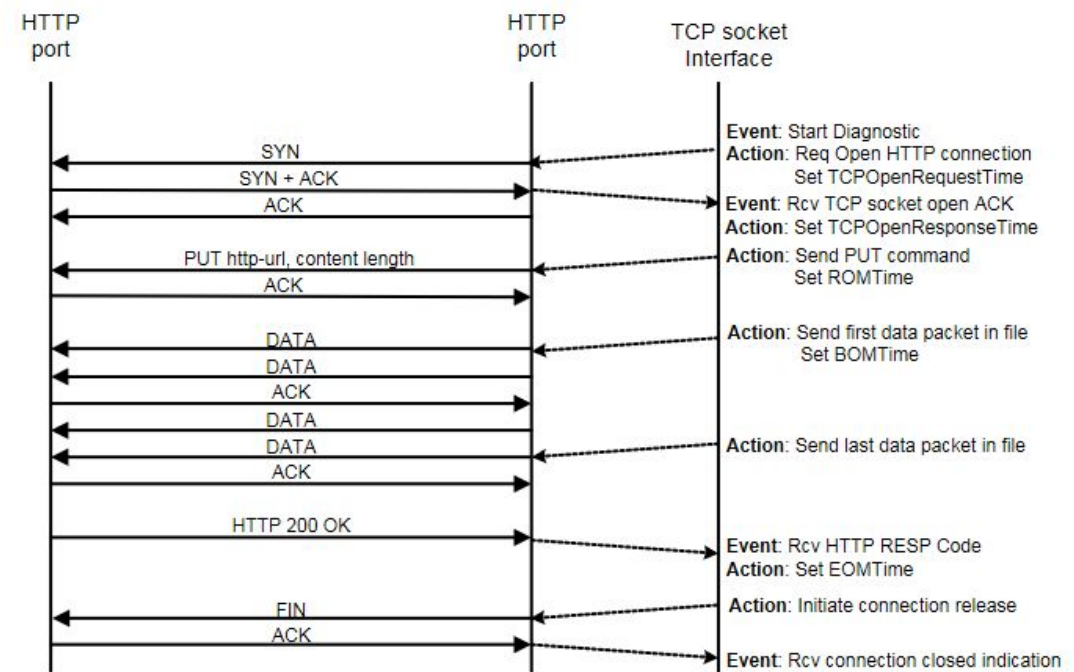
Above Socket (HTTP)	Socket Layer	Below Socket
EOMTime	ROMTime	TotalBytesSent (Ethernet)
	BOMTime	EthernetPriority (Ethernet)
	TCPOpenRequestTime	DSCP setting (IP)
	TCPOpenResponseTime	

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Performance Testing - Issues

Issues to look out for:

- Routers online or offline at the times of the tests.
- Consumer router utilisation (i.e. streaming YT/Netflix etc…) during speed testing.
- Device compatibility (TR-143 Amendment 1) – i.e. TCP multi-threading.
- Performance Server resources (CPU, RAM, Storage).
- Network congestion & bottlenecks.

TR-143 Amendment 1 – Supporting Multithreading:

- DL & UL speed testing relies on TCP sockets.
- TR-143 Amendment 1 includes

DownloadDiagnostics > Object

- DownloadDiagnosticMaxConnections
- NumberOfConnections

UploadDiagnostics > Object

- UploadDiagnosticsMaxConnections
- NumberOfConnections

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Performance Testing – TCP Multi-threading

Performance Testing – Speed Test Results

Day #	Date	Time Slot	12/1 Plan		25/5 Plan		50/20 Plan		100/40 Plan	
			DL (Mbps)	% of Total	DL (Mbps)	% of Total	DL (Mbps)	% of Total	DL (Mbps)	% of Total
				12.00		25.00		50.00		100.00
Day 1	18/09/2020	3-4am	13.60	113%	25.78	103%	47.05	94%	97.95	98%
Fri		4-5am	12.76	106%	24.77	99%	44.77	90%	100.82	101%
		5-6am	12.23	102%	23.55	94%	42.22	84%	91.48	91%
		7-8pm	12.18	101%	23.94	96%	43.12	86%	101.01	101%
		8-9pm	13.20	110%	0.00	0%	44.42	89%	87.81	88%
		9-10pm	11.54	96%	21.66	87%	37.99	76%	88.47	88%
		10-11pm	12.69	106%	21.16	85%	41.87	84%	70.06	70%
Day 2	19/09/2020	3-4am	12.54	104%	24.52	98%	44.06	88%	86.97	87%
Sat		4-5am	12.42	104%	24.93	100%	46.63	93%	90.98	91%
		5-6am	12.65	105%	25.42	102%	46.26	93%	90.28	90%
		7-8pm	12.21	102%	23.69	95%	41.99	84%	87.95	88%
		8-9pm	11.82	98%	22.55	90%	40.10	80%	85.84	86%
		9-10pm	12.08	101%	23.45	94%	41.67	83%	86.95	87%
		10-11pm	12.22	102%	24.91	100%	45.13	90%	87.13	87%
Day 3	20/09/2020	3-4am	12.75	106%	25.42	102%	44.63	89%	91.43	91%
Sun		4-5am	12.70	106%	25.25	101%	45.52	91%	90.73	91%
		5-6am	12.56	105%	25.29	101%	45.60	91%	90.21	90%
		7-8pm	12.24	102%	24.07	96%	44.25	89%	90.12	90%
		8-9pm	11.97	100%	23.01	92%	42.17	84%	86.83	87%
		9-10pm	12.21	102%	24.04	96%	40.73	81%	88.05	88%
		10-11pm	12.40	103%	24.66	99%	44.30	89%	88.14	88%
Day 4	21/09/2020	3-4am	12.61	105%	24.93	100%	45.59	91%	90.96	91%
Mon										

Day #	Date	Time Slot	12/1 Plan		25/5 Plan		50/20 Plan		100/40 Plan	
Day 12	29/09/2020	3-4am	12.79	107%	25.79	103%	45.96	92%	90.78	91%
Tue		4-5am	12.80	107%	25.92	104%	46.38	93%	90.58	91%
		5-6am	12.56	105%	24.93	100%	46.47	93%	90.31	90%
		7-8pm	11.75	98%	22.12	88%	40.69	81%	87.36	87%
		8-9pm	10.85	90%	19.88	80%	36.53	73%	72.33	72%
		9-10pm	11.83	99%	22.38	90%	37.62	75%	77.48	77%
		10-11pm	12.31	103%	24.19	97%	43.47	87%	84.60	85%
Day 13	30/09/2020	3-4am	12.65	105%	25.47	102%	45.43	91%	89.38	89%
Wed		4-5am	12.52	104%	25.32	101%	44.92	90%	89.30	89%
		5-6am	12.58	105%	25.41	102%	44.98	90%	90.15	90%
		7-8pm	12.21	102%	23.85	95%	42.93	86%	89.66	90%
		8-9pm	11.68	97%	21.53	86%	42.50	85%	85.60	86%
		9-10pm	11.35	95%	23.05	92%	41.76	84%	83.87	84%
		10-11pm	11.92	99%	24.48	98%	43.64	87%	84.37	84%
Day 14	1/10/2020	3-4am	12.64	105%	24.97	100%	44.59	89%	90.02	90%
Thur		4-5am	12.58	105%	25.29	101%	46.03	92%	89.40	89%
		5-6am	12.49	104%	24.36	97%	45.78	92%	87.88	88%
		7-8pm	12.36	103%	24.54	98%	44.76	90%	91.12	91%
		8-9pm	12.14	101%	22.77	91%	42.67	85%	89.35	89%
		9-10pm	12.18	101%	23.96	96%	41.95	84%	90.98	91%
		10-11pm	12.48	104%	25.26	101%	43.83	88%	90.19	90%

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Performance Testing – Percentiles Summaries

Test Description	12/1 Plan		25/5 Plan		50/20 Plan		100/40 Plan	
	DL (Mbps)	% of Total	DL (Mbps)	% of Total	DL (Mbps)	% of Total	DL (Mbps)	% of Total
3rd Lowest Speed (PEAK) (56 samples)	11.45	95%	21.08	84%	37.99	76%	77.48	77%
3rd Lowest Speed (Off PEAK) (42 samples)	12.30	103%	24.43	98%	44.16	88%	88.27	88%
3rd Highest Speed (PEAK) (56 samples)	12.62	105%	25.40	102%	45.65	91%	91.12	91%
3rd Highest Speed (Off PEAK) (42 samples)	12.81	107%	25.89	104%	46.63	93%	91.48	91%

Broadband Performance Diagnostics - References

- https://www.acma.gov.au/test-nbn-service-working
- https://www.broadband-forum.org/technical/download/TR-143_Amendment-1_Corrigendum-1.pdf
- https://cwmp-data-models.broadband-forum.org/tr-143-1-1-0.html#D.TR-1:4.DownloadDiagnostics
- https://friendly-tech.com/broadband-speed-testing-compliance-acma/
- https://friendly-tech.com/fcc-speed-test/
- https://friendly-tech.com/products/tr-069-device-management/
- https://www.youtube.com/user/TR069FriendlyTech

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About Friendly Technologies

Friendly Technologies at a Glance

Software company founded in 1997

Device Management since 2006

200+ customers worldwide

Active Member of Broadband Forum & Open Mobile Alliance

The most installed Unified Device Management solution in the world

Friendly
USA
Sales

Friendly
Ukraine
R&D, Services

Friendly
Israel
Headquarters

Friendly
India
Services

Friendly
Mexico
Sales, Services

Friendly
Colombia
Sales, Services

Friendly
South Africa
Sales

Friendly
ANZ
Sales

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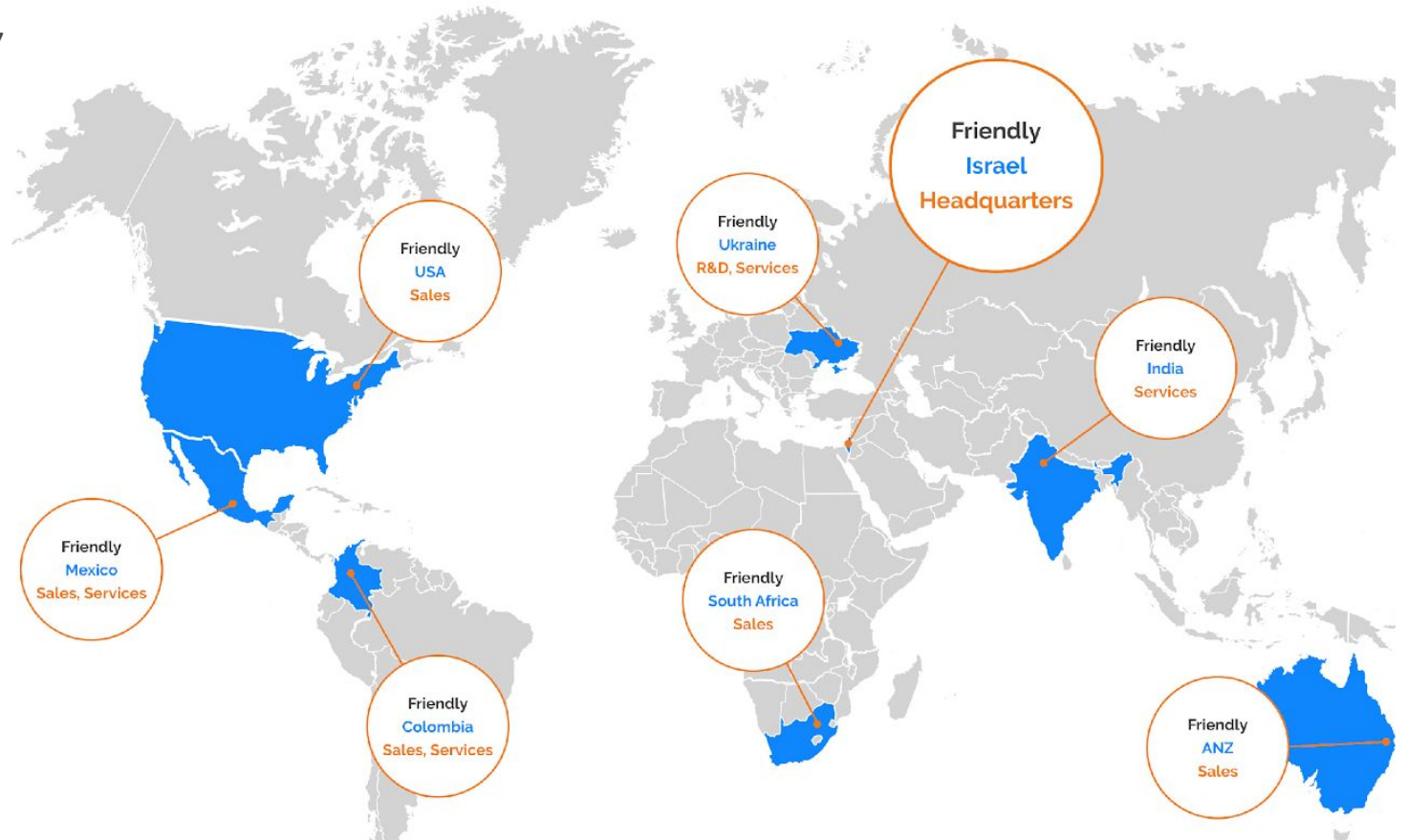
Select Customers

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Unified Line of Products

One-IoT™ Platform **Smart Home** **TR-069 Device Management** **Wi-Fi Management** **QoE Monitoring** **Embedded Clients**

- TR-069 client
- TR-369/USP client
- Smart Home client
- OMA-DM client
- LwM2M client

Friendly Unified Device Management Engine

TR-069 | TR-369 USP | LwM2M | MQTT | SCEF | OMA-DM | HTTP | CoAP

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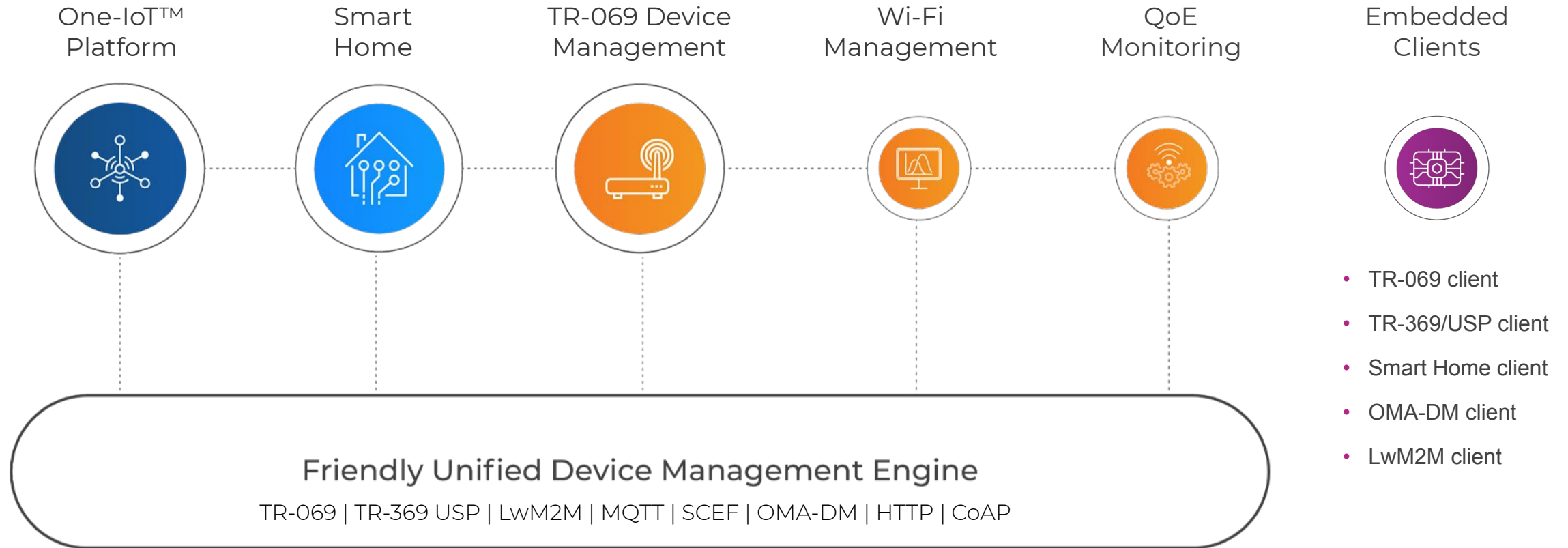
Why Friendly Technologies?

Experts in Device Management

Friendly Technologies manages all types of protocols on one unified platform.

Carrier-Grade

Extensive experience with large scale deployments in low ARPU markets with large numbers of devices. Our carrier customers can profitably compete in the LPWAN low ARPU market.

Smart Technology

Friendly utilizes open standards, enabling freedom of hardware vendor choice.

Product-Centric Company

We aim for maximum automation and ease of use with no or minimum required professional services.

Agile & Attentive

Attentive to customer needs, agile, dynamic, and responsive. What takes Friendly weeks can take other companies months.

Dynamic Capabilities

Extensive IoT line of products - IoT Device Management, Smart Home, Hospital @ Home, additional IoT vertical market applications.

For more information and a live
demo, please contact
insidesales@friendly-tech.com

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