D-Link DIR-615 Teardown

Team 750R

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Introduction

Our team chose an old router to teardown, specifically, a D-Link DIR-615 revision B2. The reason we chose a router was because we realized that many of us had spare routers lying around, leading us to believe that the technology inside was common and easily produced. When we researched more, we discovered that routers have many of the basic components that all computers have, such as a CPU, RAM, and flash memory. We also thought it would be interesting to research wireless and radio technologies.

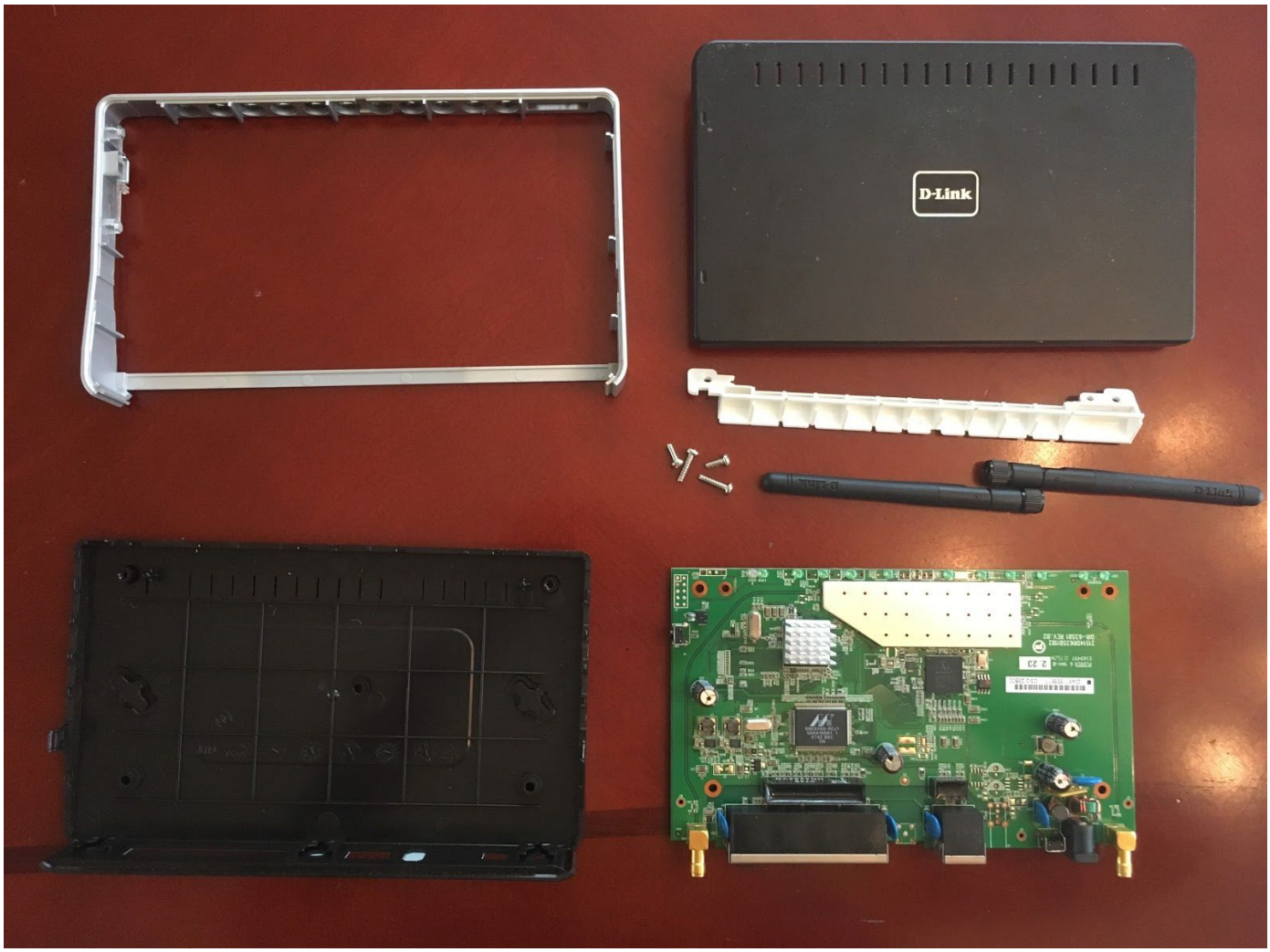
Unfortunately, in the three routers we attempted to disassemble, none of them had TI parts. However, by scouring the internet for information about this router's chipset, we were able to find compatible TI parts that, with many adjustments, would make suitable replacements in the chipset. Additionally, we researched some other parts in the router that are not chips, and are thus not made by TI, but serve an integral role nonetheless.

Pictures of the Router

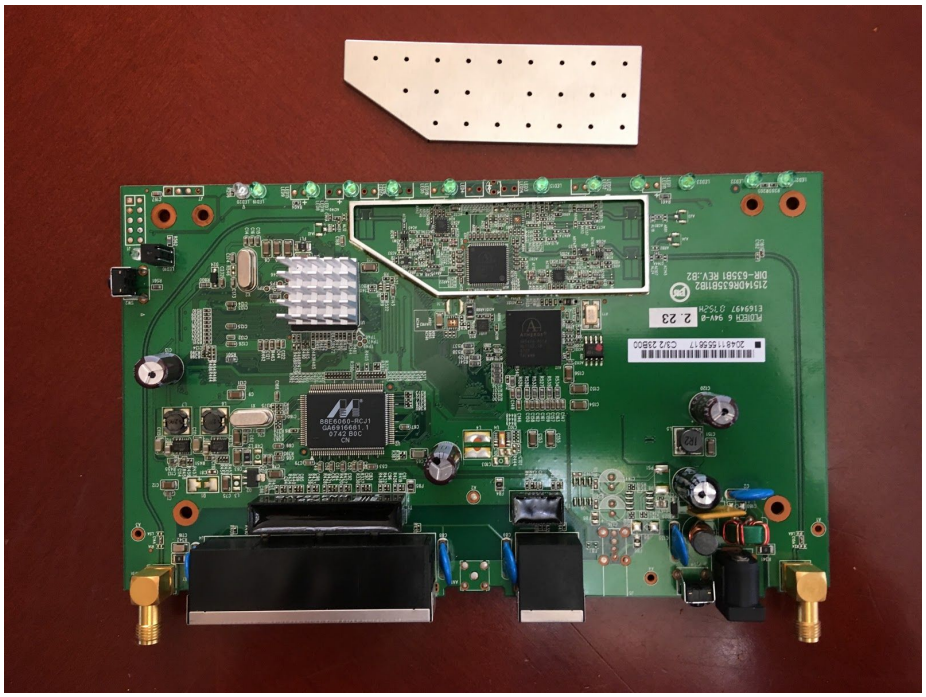
Top view of the router

Bottom view of the router

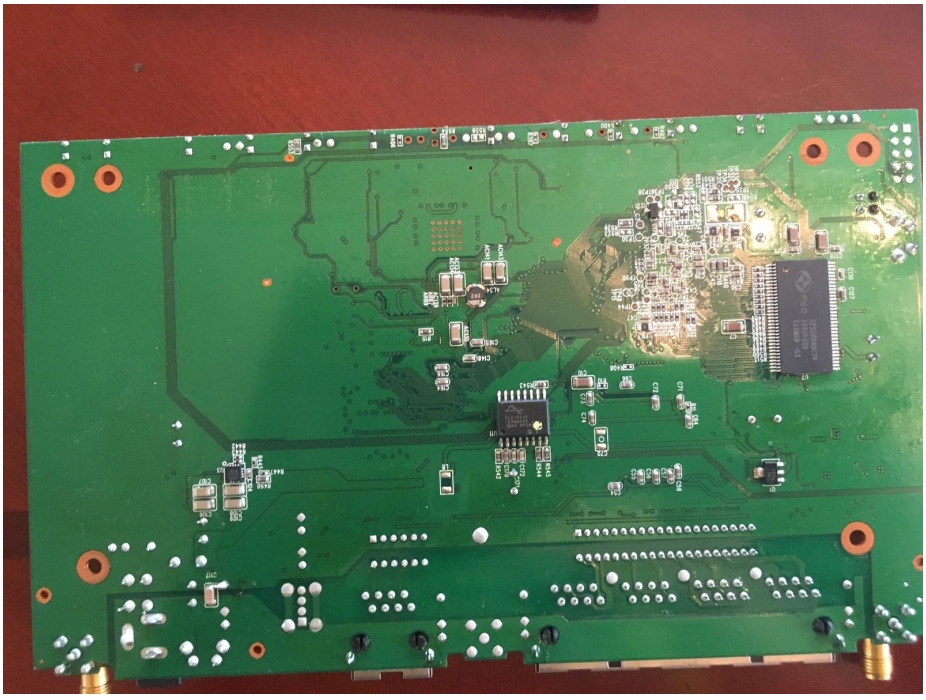
Disassembly



Screws, antenna, and casing removed, exposing the circuit board.



A metal plate is removed, exposing more parts including an Atheros chip.



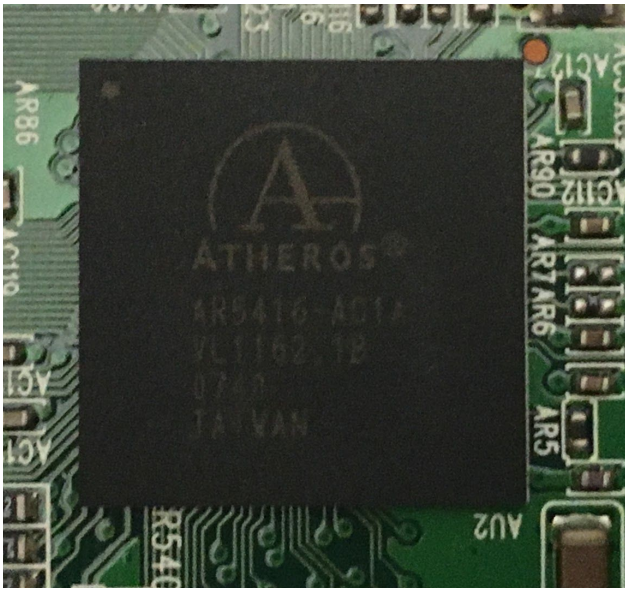
Bottom view of the circuit board

Integrated Circuit Chips

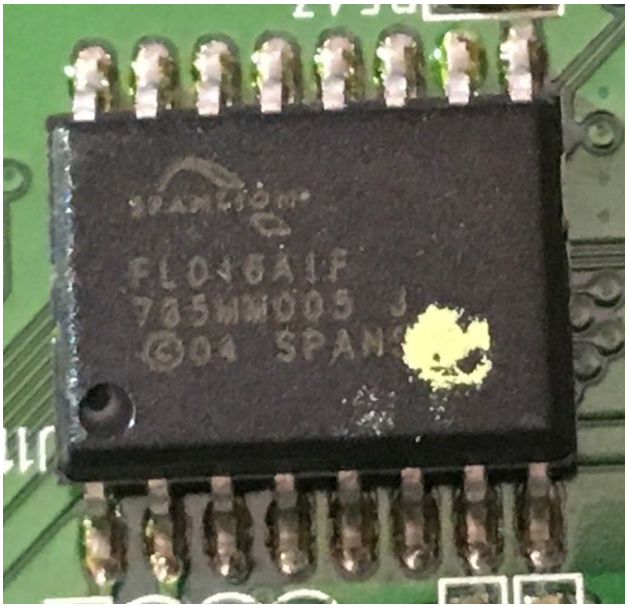
Marvell 88E6060-RCJ1

Atheros AR2122-AL1A- revealed under metal plate

Atheros AR2122-AL1A



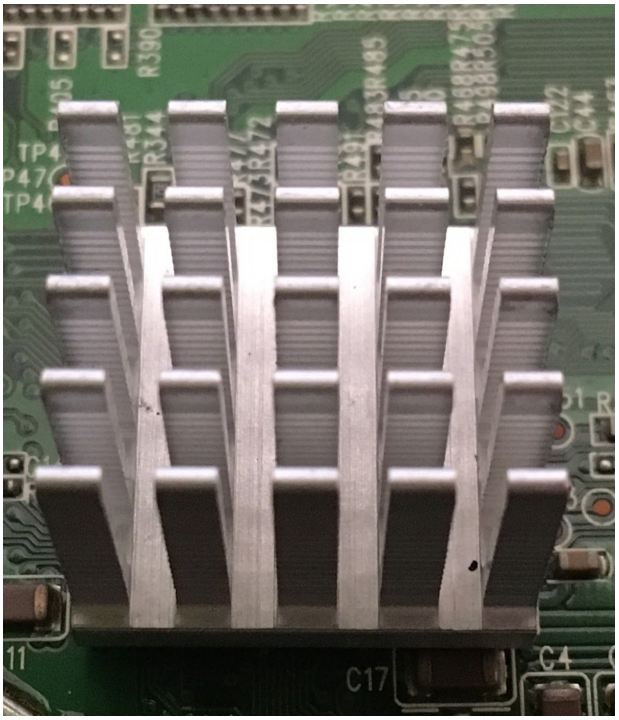
Atheros AR5416-AC1A



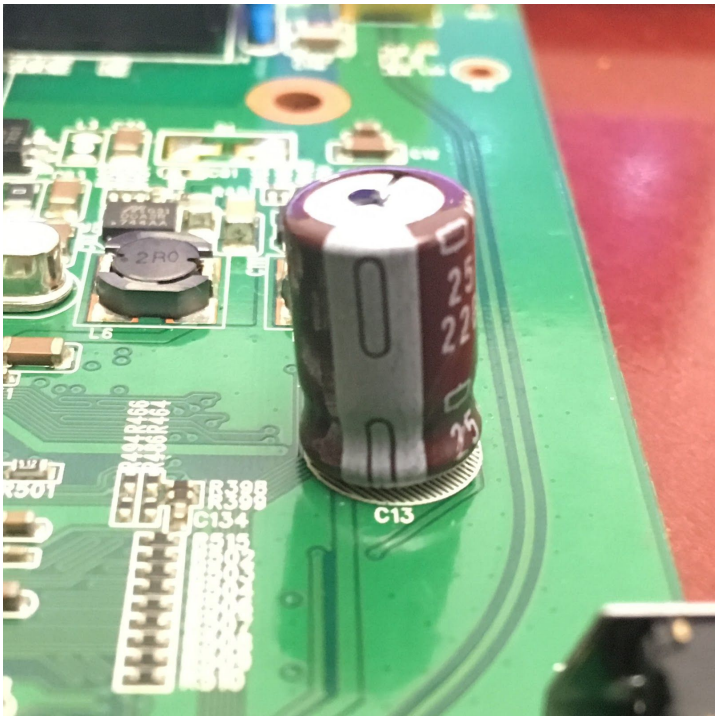
Spansion FL016AIF

Ubicom IP5090U, revealed under the heatsink

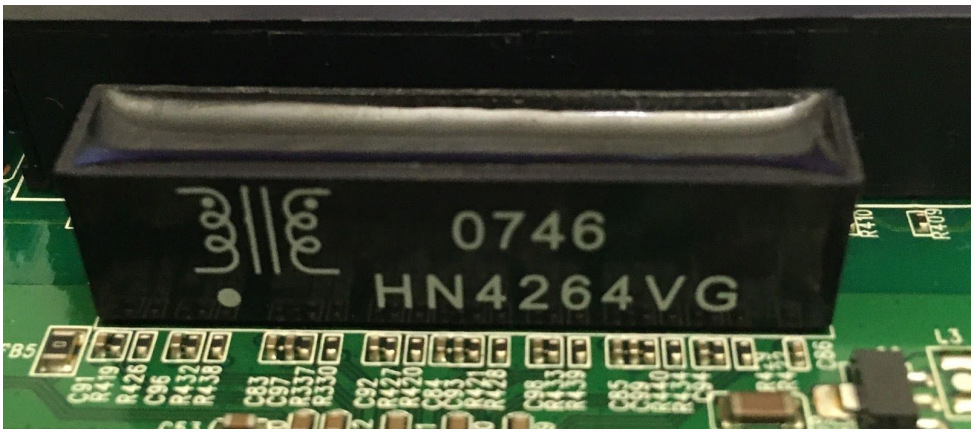
Other Parts



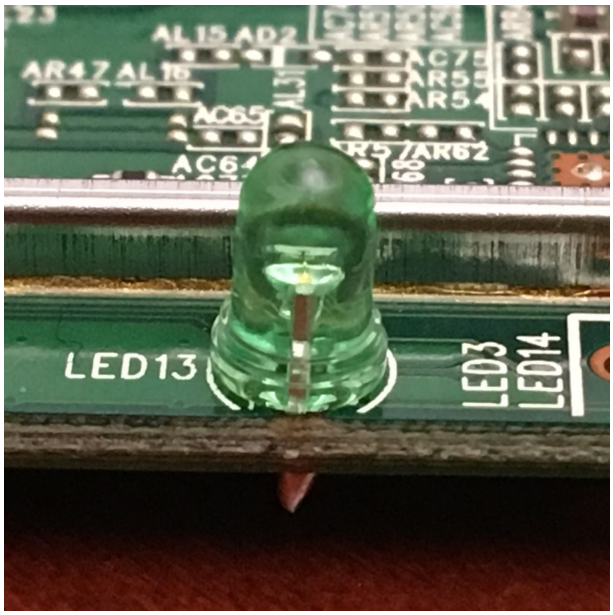
Heatsink to prevent the CPU from Overheating



Capacitors to store electricity for later use



HN4264VG 10/100Base-T Transformer. 10/100Base-T are the standards for ethernet cables. The transformer is used in signal isolation and conditioning.



A string of LEDs are used to communicate with the user. LED's work by moving electrons through a semiconductor. power

An Omnidirectional Antenna which amplifies signals in all directions in one plane, with the

decreasing as you go down.

IC Chips Information and TI Equivalents

Purpose	How it Works	In Router	TI Equivalent
CPU	Executes code; processes input from input devices and outputs to output devices.	Ubicom IP5090U ● 220 MHz ● 10 threads	RM48L952 ● 220 MHz
Flash Memory	A form of data storage that can be electrically erased and reprogrammed. It is non-volatile: it can retain data after being turned off and back on.	Spansion FL016AIF ● 16 Megabit ● 3.0 V ● 50 MHz SPI	SM28VLT32-HT ● 32 Megabit ● 3.3V ● 12 MHz SPI
RAM Memory	Storage that is quickly accessed by the processor, however, data is lost when it is turned off.	PCS A2S28D40CTP ● 16MB	SMV512K32-SP ● 32MB
Baseband Processor	A chip that manages all the radio functions in between two pieces of equipment according to a set protocol.	Atheros AR5416-AC1A ● Single-Chip MAC and Baseband Processor ● For 802.11a/b/g/n	TNETW1250 ● Single-Chip MAC and Baseband Processor ● for 802.11a/b/g
2.4GHz Radio	A chip that transmits and receives radio signals on the 2.4GHz bandwidth, the most common bandwidth for a variety of applications.	Atheros AR2122-AL1A ● 802.11n 2x2	WL1835MOD ● 802.11n 2x2
Ethernet Switch	A chip that establishes a network connection between connected computers by allowing the computers to communicate. It is not merely a hub: it will only send data packets to its intended destination	Marvell 88E6060-RCJ1 ● primarily designed as an ethernet switch ● 6 ports	TMS320DM647 ● Has an Ethernet Switch subsystem ● 3 ports

	port.		

Conclusion

In conclusion, we learned about how semiconductor integrated circuits work, and how many IC's come together to form a chipset. This gave us a greater understanding of how different computers work, prompting us to research the chipset of the Vex Cortex. This inspired our other online challenge, where we designed and detailed an extension to the Vex Cortex. Additionally, we learned how different wireless technologies, such as the 802.11 standards for WLAN and the 2.4 MHz standard for Wifi and other communication systems. Overall, this experiment gave us a deeper understanding of all the technologies we use everyday and take for granted.