Why -48V DC?

Why the most of telecom equipments use the -48V DC for their input voltage rather than the 110/220 V AC?

-48V DC has been a traditional voltage for telephone applications. The reason for selecting that voltage has need that the voltage was enough to supply enough power to telephone equipments through several kilometres of telephone copper cable, low enough not to cause major electrical hazards and suitable for battery backup system. Large battery backups are used to guarantee that telecom equipments can get constant power no matter if mains power fails. Telephone switches started using -48V DC in the beginning, and more equipments needed to be placed on telecom company premises adopted this practice because this was the system telephone companies had already the infrastructure for this.

The text above described why 48V and DC. You might ask *why -48V DC instead of +48V DC*. The reason for electing -48V in reference to ground are avoiding the nasty galvanic effects in telephone cabling (+48V would have nastier effect on wet cabling).

When comparing -48VDC system to 110/220V AC system in telecom environment it can be seen the following points (plus and minus facts):

For -48VDC system:

+/-	Fact
+	Directly suitable for powering normal telephone lines
+	Widely installed in telecom company premises
+	Easy to do battery backup
+	Less dangerous than 110/220V AC system (electrical shock sense)
-	Larger losses in wiring when power is transferred (larger currents needed)
-	Equipment power supplied need to be lower volume
-	Special designs compared to normal mains power supply (not more complicated though)
+/-	Different installing and safety practices than normal mains power

For 110/220V AC systems:

+/-	Fact
+	Widely used electrical distribution
+	Most power supplies are designed for those voltage
+	Voltage can be easily converted using transformers
+	High voltage transfers high power with pretty low current
-	Dangerous voltage and dangerous frequency
-	Potential source for AC frequency noise
-	Hard to do battery backup (UPS devices are complicated)

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