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TCE Tinycore Linux Project englisch

[Versionsgeschichte interaktiv durchsuchen](#)

[Visuell Wikitext](#)

Version vom 7. August 2020, 09:52 Uhr (

[Quelltext anzeigen](#))

[OE2WAO](#) ([Diskussion](#) | [Beiträge](#))

[K](#) ([→Hardware](#))

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Aktuelle Version vom 8. Januar 2023, 15:

[01 Uhr \(Quelltext anzeigen\)](#)

[OE2WAO](#) ([Diskussion](#) | [Beiträge](#))

Markierung: [Visuelle Bearbeitung](#)

(2 dazwischenliegende Versionen desselben Benutzers werden nicht angezeigt)

Zeile 2:

==Intro==

[[Bild:PPC.jpg|thumb|500MHz LowPower industrial PC]]

This hamradio software project is based on [http://www.tinycorelinux.com TCE - Tinycore Linux], an embedded software system used on platforms like industrial pc, ALIX and others, and offers **services and possibilities like**

– ***packet radio,**

– ***BBS,**

– ***APRS,**

– ***lightning log,**

– ***small webserver,**

– ***SVX-Link (Echolink)**

Zeile 2:

==Intro==

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This hamradio software project is based on [http://www.tinycorelinux.com TCE - Tinycore Linux], an embedded software system used on platforms like industrial pc, ALIX and others, and offers

+ *** Packet Radio - (multichannel /multibaud e.g. 1k2 2k4 4k8 9k6..)**

+ ***APRS - UDPGATE (IGATE, also multibaud, e.g. 1k2 and 9k6)**

+ ***LoRa APRS (NEW!) incl. Mic-E**

+ ***SAMNET**

+ ***lightning detection**

+ ***Radiosondes RX (weather balloon tracker)**

+ ***small web servers**

+ ***Weather station with different sensors**

+ ***SVX Link (Echolink)**

+ ***WINLINK Global Radio Email (RMS Packet)**

+ ***Switching and measuring center**

	+	
especialy in networks like HAMNET and similar. 		especialy in networks like HAMNET and similar.
One goal is a minimum on material expenditure and also a minimal current consumption, followed by a maximum of features		One goal is a minimum on material expenditure and also a minimal current consumption, followed by a maximum of features
Zeile 16:		Zeile 23:
==Hardware==		==Hardware==
[[Bild:12v-anschluss.jpg thumb polarity industrial PC]]		[[Bild:12v-anschluss.jpg thumb polarity industrial PC]]
- DH2IW Wolfgang, OE2WAO Mike and OE5DXL Chris are doing first experiments with discarded industrial pc hardware, a 500MHz AMD Geode CPU with up to 256MB of RAM, and a minimal power input of <5Watt (for remaining stock ask [http://www.oe2wao.info OE2WAO]). 	+	DH2IW Wolfgang, OE2WAO Mike and OE5DXL Chris are doing experiments with discarded industrial pc hardware, a 500MHz AMD Geode CPU with up to 256MB of RAM, and a minimal power input of <5Watt (for remaining stock ask [http://www.oe2wao.info OE2WAO]).
But every other hardware plattform like ALIX, Raspberry Pi or similar will do. 		But every other hardware plattform like ALIX, Raspberry Pi or similar will do.
- The operating system is placed on a CF memory card (>32MB). 	+	The operating system is placed on a CF/ SD memory card (>32MB).
- A USB soundcard is used for operating AFSK/FSK modulation. One special character of working devices is a 3rd connector beside microphone and line out, the line in. Because these device are real stereo and make it possible to operate two separate channels on one sound card.	+	If available the internal, or in other cases an USB soundcard is used for operating AFSK/FSK modulation. One special character of working devices is a 3rd connector beside microphone and line out, the line in. Because these device are real stereo and make it possible to operate two separate channels even on one sound card.
- ===Connections and conversion of the used industrial pc ===	+	===Connections and conversion of our used industrial PC ===
[[Bild:12v-umbau.jpg thumb power supply conversion 12V]]		[[Bild:12v-umbau.jpg thumb power supply conversion 12V]]

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A ready-to-use software image is located on the [http://www.oe2wao.info/tce OE2WAO Server] (e.g. tc455x-128.zip means version 4.55 with GUI on 128MB data drive)

There is also a version for raspberry pi hardware in test, and available soon.

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DL1Nux has created a wiki on installation and operating the dxlToolchain <http://dxlwiki.dl1nux.de/> (german)

===Software schematic===

===Software schematic===

Aktuelle Version vom 8. Januar 2023, 15:01 Uhr



Für die deutsche Version dieses Projekts >>[hier klicken](#)<<

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2.1 Connections and conversion of our used industrial PC	19
2.2 Soundcard	20
3 Software	20
3.1 Software schematic	20
4 Help	20

Intro

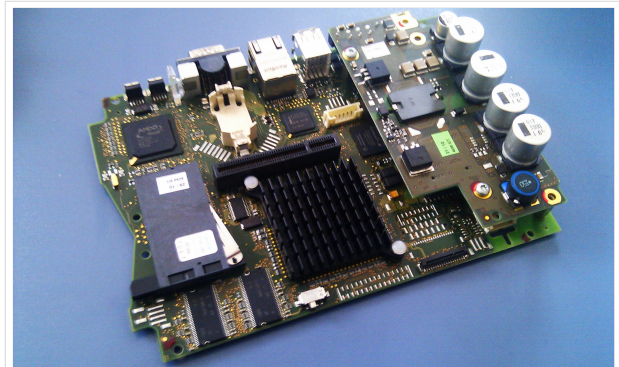
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More information on the hamradio TCE - tinycore linux project coming here soon



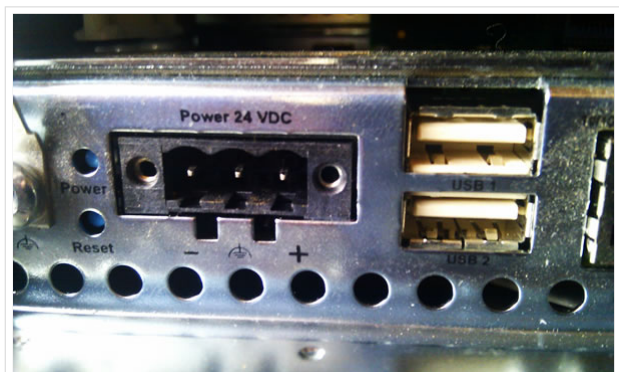
500MHz LowPower industrial PC

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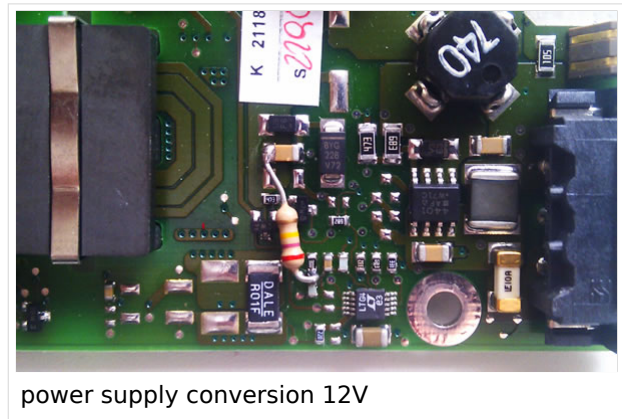
polarity industrial PC

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Connections and conversion of our used industrial PC

There are several connectors (COM, USB, network) on the frontside of our panels, as you can see. For correct polarity it is important to connect the + pole to the right pin of the 3pol power supply connector, the pin which is closer to the USB ports. The negative pole is the left pin.

The normal board supply is 24V.
That we can use it with our 12V power supply, we have to do a little modification. Just add a 270k Ohm resistor on the bottom side of the power supply as shown in the picture.



Soundcard

If there is no onboard sound available, you can use a USB soundcard instead. Suggested types you can find [here](#).

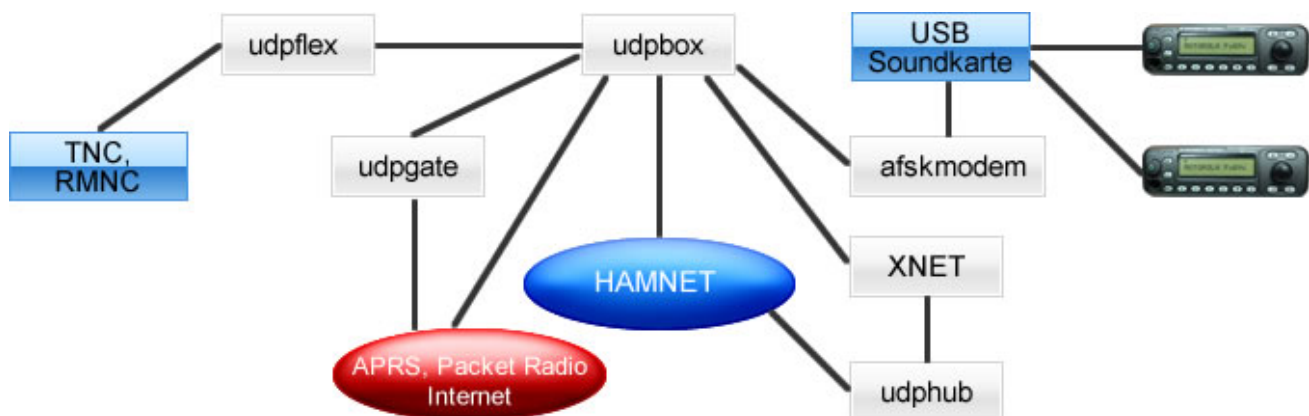
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Software schematic



Help

If you need help on configuring the software packages you can contact OE5DXL on packet radio convers channel 501.

TCE Tinycore Linux Project englisch und Benutzer:OE2WAO: Unterschied zwischen den Seiten

VisuellWikitext

Version vom 7. August 2020, 09:52 Uhr (
Quelltext anzeigen)
OE2WAO ([Diskussion](#) | [Beiträge](#))
K ([→Hardware](#))

Aktuelle Version vom 9. August 2020, 23:
41 Uhr (Quelltext anzeigen)
OE2WAO ([Diskussion](#) | [Beiträge](#))
(Die Seite wurde neu angelegt:
„https://oe2wao.info“)

Zeile 1:

[[Datei:Deutschland-flagge.gif]] Für
die deutsche Version dieses Projekts
[[TCE Tinycore_Linux_Projekt | >>hier
klicken<<]]

==Intro==

[[Bild:PPC.jpg|thumb|500MHz
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This hamradio software project is
based on [<http://www.tinycorelinux.com> TCE - Tinycore Linux], an
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*APRS,

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*small webserver,

*SVX-Link (Echolink)

especialy in networks like HAMNET
and similar.

One goal is a minimum on material
expenditure and also a minimal
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Zeile 1:

https://oe2wao.info

+

More information on the hamradio
TCE - tinycore linux project coming
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==Hardware==

[[Bild:12v-anschluss.
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experiments with discarded industrial
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CPU with up to 256MB of RAM, and a
minimal power input of <5Watt (for
remaining stock ask [<http://www.oe2wao.info> OE2WAO]).

But every other hardware platform
like ALIX, Raspberry Pi or similar will
do.

The operating system is placed on a
CF memory card (>32MB).

A USB soundcard is used for
operating AFSK/FSK modulation. One
special character of working devices
is a 3rd connector beside microphone
and line out, the line in. Because
these device are real stereo and
make it possible to operate two
separate channels on one sound card.

===Connections and conversion of
the used industrial pc===

[[Bild:12v-umbau.jpg|thumb|power
supply conversion 12V]]

There are several connectors (COM, USB, network) on the frontside of our panels, as you can see. For correct polarity it is important to connect the + pole to the right pin of the 3pol power supply connector, the pin which is closer to the USB ports. The negative pole is the left pin.

The normal board supply is 24V.

That we can use it with our 12V power supply, we have to do a little modification. Just add a 270k Ohm resistor on the bottom side of the power supply as shown in the picture.

===Soundcard===

If there is no onboard sound available, you can use a USB soundcard instead. Suggested types you can find [[Geeignete Soundkarten|here]].

===Software===

A ready-to-use software image is located on the [<http://www.oe2wao.info/tce> OE2WAO Server] (e.g. tc455x-128.zip means version 4.55 with GUI on 128MB data drive)

There is also a version for raspberry pi hardware in test, and available soon.

===Software schematic===

[[Datei:Udpboxs.jpg]]

==Help==

–

If you need help on configuring the software packages you can contact OE5DXL on packet radio convers channel 501.

–

Aktuelle Version vom 9. August 2020, 23:41 Uhr

<https://oe2wao.info>

TCE Tinycore Linux Project englisch und Geeignete Soundkarten: Unterschied zwischen den Seiten

Visuell Wikitext

Version vom 7. August 2020, 09:52 Uhr ([Quelltext anzeigen](#))
 OE2WAO ([Diskussion](#) | [Beiträge](#))
 K ([→Hardware](#))

Aktuelle Version vom 19. September 2014, 15:15 Uhr ([Quelltext anzeigen](#))
 OE2LSP ([Diskussion](#) | [Beiträge](#))
 ([→Einkanal Karten \(Mono\)](#))

Zeile 1:		Zeile 1:
–	[[Datei:Deutschland-flagge.gif]] Für die deutsche Version dieses Projekts [[TCE Tinycore Linux Projekt >>hier klicken<<]]	+ Nachfolgend eine Auflistung geeigneter USB Soundkarten für das TCE Projekt.
–	==Intro==	+ Der Begriff Mono bzw. Stereo bezieht sich in unserem Fall auf den Line-In Eingang der Soundkarte.
–	[[Bild:PPC.jpg thumb 500MHz LowPower industrial PC]]	+ "The term MONO or STEREO in our case refers to the line-in input of the soundcard."
–	This hamradio software project is based on [http://www.tinycorelinux.com TCE - Tinycore Linux], an embedded software system used on platforms like industrial pc, ALIX and others, and offers services and possibilities like	
–	*packet radio,	
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–	*small webserver,	
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–	especialy in networks like HAMNET and similar. 	
–	One goal is a minimum on material expenditure and also a minimal current consumption, followed by a maximum of features	

- More information on the hamradio TCE - tinycore linux project coming here soon

==Einkanal Karten (Mono)==

- + Diese Karten sind geeignet für Anlagen mit nur einer geplanten Betriebsart am TCE.

- + "These cards are suitable for systems with only one mode of operation envisaged in the TCE."

- ==Hardware==

- [[Bild:12v-anschluss.jpg|thumb|polarity industrial PC]]

- + [[Bild:Usb-sound1.jpg|USB Soundkarte]]

- + [[Bild:Usb-sound2.jpg|USB Soundkarte]]

- DH2IW Wolfgang, OE2WAO Mike and OE5DXL Chris are doing first experiments with discarded industrial pc hardware, a 500MHz AMD Geode CPU with up to 256MB of RAM, and a minimal power input of <5Watt (for remaining stock ask [<http://www.oe2wao.info> OE2WAO]).

- But every other hardware platform like ALIX, Raspberry Pi or similar will do.

==Zweikanal Karten (Stereo)==

- The operating system is placed on a CF memory card (>32MB).

- + Diese Karten sind geeignet für Anlagen mit einer geplanten Betriebsart auf zwei unterschiedlichen Geräten, oder generell für zwei verschiedene Betriebsarten (APRS + Packet Radio) am TCE. So wird dann bspw. auf dem linken LS Kanal Packet Radio mit 1k2 und 9k6 gearbeitet, und der rechte LS Kanal ist für APRS (analog dazu der stereo Line-In).

- + "These cards are suitable for systems with a planned operation on two different devices, or generally for two different modes (APRS + Packet

		+	Radio) on TCE. So then, for example, on the left speaker channel packet radio with 1k2 and 9k6, and on the right speaker channel APRS (analogous the stereo line-in)."
-	A USB soundcard is used for operating AFSK/FSK modulation. One special character of working devices is a 3rd connector beside microphone and line out, the line in. Because these device are real stereo and make it possible to operate two separate channels on one sound card.	+	[[Bild:Usb-sounds1.jpg USB Soundkarte]]
		+	[[Bild:Usb-sounds2.jpg USB Soundkarte]]
-	===Connections and conversion of the used industrial pc===	+	==Nicht geeignete Karten==
-	[[Bild:12v-umbau.jpg thumb power supply conversion 12V]]	+	Diese Karten sind aufgrund der unzureichenden Eingangskreise nicht bzw. nur bedingt nach Umbau verwendbar.
-	There are several connectors (COM, USB, network) on the frontside of our panels, as you can see. For correct polarity it is important to connect the + pole to the right pin of the 3pol power supply connector, the pin which is closer to the USB ports. The negative pole is the left pin. 	+	"These cards are NOT suitable due to insufficient input circuits."
-	The normal board supply is 24V. 	+	[[Bild:Usb-sound0.jpg USB Soundkarte]]
-	That we can use it with our 12V power supply, we have to do a little modification. Just add a 270k Ohm resistor on the bottom side of the power supply as shown in the picture.	+	[[Bild:Usb-sound3.jpg USB Soundkarte]]
-			

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- **[[Datei:Udpboxs.jpg]]**
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- **==Help==**
-
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Aktuelle Version vom 19. September 2014, 15:15 Uhr

Nachfolgend eine Auflistung geeigneter USB Soundkarten für das TCE Projekt.
 Der Begriff Mono bzw. Stereo bezieht sich in unserem Fall auf den Line-In Eingang der Soundkarte.

The term MONO or STEREO in our case refers to the line-in input of the soundcard.

Einkanal Karten (Mono)

Diese Karten sind geeignet für Anlagen mit nur einer geplanten Betriebsart am TCE.
These cards are suitable for systems with only one mode of operation envisaged in the TCE.



Zweikanal Karten (Stereo)

Diese Karten sind geeignet für Anlagen mit einer geplanten Betriebsart auf zwei unterschiedlichen Geräten, oder generell für zwei verschiedene Betriebsarten (APRS + Packet Radio) am TCE. So wird dann bspw. auf dem linken LS Kanal Packet Radio mit 1k2 und 9k6 gearbeitet, und der rechte LS Kanal ist für APRS (analog dazu der stereo Line-In).

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Nicht geeignete Karten

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These cards are NOT suitable due to insufficient input circuits.



TCE Tinycore Linux Project englisch: Unterschied zwischen den Versionen

Versionsgeschichte interaktiv durchsuchen

Visuell Wikitext

Version vom 7. August 2020, 09:52 Uhr ([Quelltext anzeigen](#))

[OE2WAO](#) ([Diskussion](#) | [Beiträge](#))

[K](#) (→[Hardware](#))

← [Zum vorherigen Versionsunterschied](#)

Aktuelle Version vom 8. Januar 2023, 15:01 Uhr ([Quelltext anzeigen](#))

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Markierung: [Visuelle Bearbeitung](#)

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Für die deutsche Version dieses Projekts >>[hier klicken](#)<<

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Intro

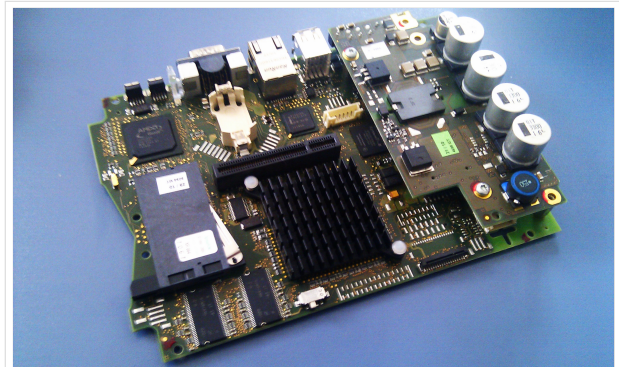
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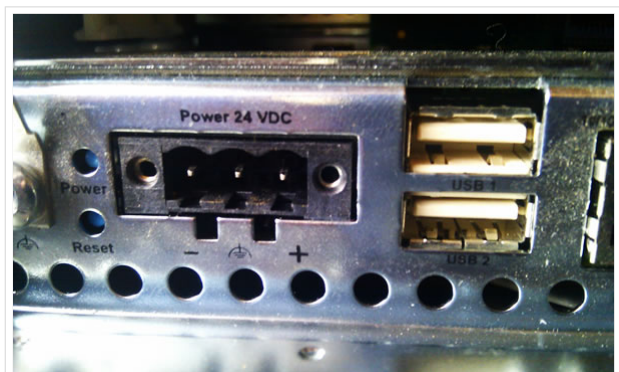
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Connections and conversion of our used industrial PC

There are several connectors (COM, USB, network) on the frontside of our panels, as you can see. For correct polarity it is important to connect the + pole to the right pin of the 3pol power supply connector, the pin which is closer to the USB ports. The negative pole is the left pin.

The normal board supply is 24V. That we can use it with our 12V power supply, we have to do a little modification. Just add a 270k Ohm resistor on the bottom side of the power supply as shown in the picture.



Soundcard

If there is no onboard sound available, you can use a USB soundcard instead. Suggested types you can find [here](#).

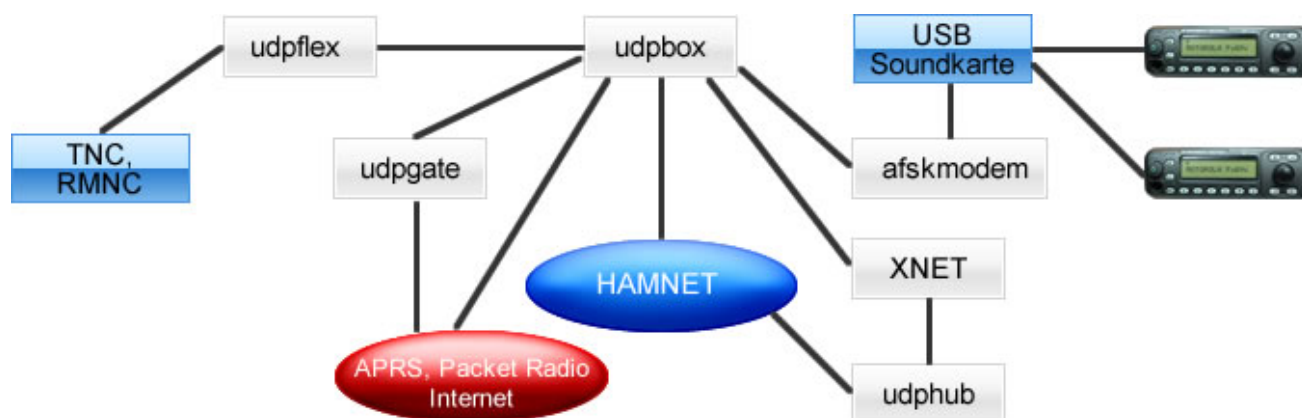
Software

A ready-to-use software image is located on the [OE2WAO Server](#) (e.g. tc455x-128.zip means version 4.55 with GUI on 128MB data drive)

There is also a version for raspberry pi hardware in test, and available soon.

DL1NIX has created a wiki on installation and operating the dxlToolchain <http://dxlwiki.dl1nux.de/> (german)

Software schematic



Help

If you need help on configuring the software packages you can contact OE5DXL on packet radio convers channel 501.

TCE Tinycore Linux Project englisch und TCE Tinycore Linux Projekt: Unterschied zwischen den Seiten

VisuellWikitext

Version vom 7. August 2020, 09:52 Uhr ([Quelltext anzeigen](#))
OE2WAO ([Diskussion](#) | [Beiträge](#))
K ([→Hardware](#))

Aktuelle Version vom 8. Januar 2023, 14:52 Uhr ([Quelltext anzeigen](#))
OE2WAO ([Diskussion](#) | [Beiträge](#))
Markierung: [Visuelle Bearbeitung](#)

Zeile 1:

- **[[Datei:Deutschland-flagge.gif]] Für die deutsche Version dieses Projekts [[TCE Tinycore Linux Projekt | >>hier klicken<<]]**
- **==Intro==**
- **[[Bild:PPC.jpg|thumb|500MHz LowPower industrial PC]]**
- **This hamradio software project is based on [http://www.tinycorelinux.com TCE - Tinycore Linux], an embedded software system used on platforms like industrial pc, ALIX and others, and offers services and possibilities like**
- ***packet radio,**
- ***BBS,**
- ***APRS,**
- ***lightning log,**
- ***small webserver,**

Zeile 1:

- + **[[Kategorie:Digitaler Backbone]]**
- + **[[Kategorie:Digitale_Betriebsarten]]**
- + **[[Kategorie:APRS]]**
- + **[[Kategorie:Packet-Radio und I-Gate]]**
- + **[[Datei:Englisch.jpg]] For english version on this project [[TCE Tinycore Linux Project englisch | >>click here<<]]**
- + **==Einleitung==**
- + **[[Bild:PPC.jpg|thumb|500MHz LowPower Industrie PC]]**
- + **Hierbei handelt es sich um eine Amateurfunk Toolchain, welche bpsw. unter Einsatz von [http://www.tinycorelinux.com TCE - Tinycore Linux] auf Embedded System wie Industrie PC, ALIX u.d.g. Services wie**
- +

		+ *[:Kategorie:Packet-Radio und I-Gate Packet Radio]] - "(Multibaud bspw. 1k2 2k4 4k8 9k6..)"
		+ *[:Kategorie:APRS APRS]] - UDPGATE "(IGATE, ebenfalls Multibaud bspw. 1k2 und 9k6)"
		+ *LoRa APRS (NEU!) inkl. Mic-E
		+ *[:SAMNET SAMNET]]
		+ *Blitzortung
		+ *Radiosonden RX (Wetterballon)
		+ *kleine Webserver
		+ *Wetterstation mit unterschiedlichen Sensoren
	*SVX-Link (Echolink)	*SVX-Link (Echolink)
-	especialy in networks like HAMNET and similar. 	+ *[:Kategorie:WINLINK WINLINK Global Radio E-Mail (RMS Packet)]]
-	One goal is a minimum on material expenditure and also a minimal current consumption, followed by a maximum of features	+ *Schalt- und Meßzentrale
-		
-	More information on the hamradio TCE - tinycore linux project coming here soon	
-		
-	==Hardware==	+ u.v.m. unter anderem im HAMNET anbindet.
-	[[Bild:12v-anschluss.jpg thumb polarit y industrial PC]]	+ Ziel ist ein minimaler Aufwand und minimale Stromaufnahme, bei maximalem Funktionsumfang.

- DH2IW Wolfgang, OE2WAO Mike and OE5DXL Chris are doing first experiments with discarded industrial pc hardware, a 500MHz AMD Geode CPU with up to 256MB of RAM, and a minimal power input of <5Watt (for remaining stock ask [http://www.oe2wao.info OE2WAO]).
	
- But every other hardware platform like ALIX, Raspberry Pi or similar will do.
	==[[TCE Hardware Hardware]]==
- The operating system is placed on a CF memory card (>32MB).
	[[TCE Hardware]] -> Informationen zur benötigten Hardware
- A USB soundcard is used for operating AFSK/FSK modulation. One special character of working devices is a 3rd connector beside microphone and line out, the line in. Because these device are real stereo and make it possible to operate two separate channels on one sound card.	==[[TCE Software Software]]==
	+ DL1NUX hat dankenswerter Weise in Wiki für dieses Projekt erstellt:
- ===Connections and conversion of the used industrial pc===	+ [http://dxlwiki.dl1nux.de/ http://dxlwiki.dl1nux.de/]
- [[Bild:12v-umbau.jpg thumb power supply conversion 12V]]	
- There are several connectors (COM, USB, network) on the frontside of our panels, as you can see. For correct polarity it is important to connent the + pole to the right pin of the 3pol power supply connector, the pin which is closer to the USB ports. The negative pole is the left pin.
	
The normal board supply is 24V.
	

-	+ ===[[TCE Software Einstellungen & Bedienung]]===
- That we can use it with our 12V power supply, we have to do a little modification. Just add a 270k Ohm resistor on the bottom side of the power supply as shown in the picture.	+ Informationen zur Installation, Konfiguration und zu den einzelnen Modulen
	+ ===[[TCE Software Installation Installation & Download]]=== + Dieses Kapitel erklärt die Installation vom TCE Image unter dem jeweilig verwendeten Betriebssystem
- ===Soundcard=== If there is no onboard sound available, you can use a USB soundcard instead. Suggested types you can find [[Geeignete Soundkarten here]].	+ ==Einsatz==
- ==Software== A ready-to-use software image is located on the [http://www.oe2wao.info/tce OE2WAO Server] (e.g. tc455x-128.zip means version 4.55 with GUI on 128MB data drive) 	+ [[Bild:Db0wqs-aprs-k.jpg thumb DB0WGS APRS & PR Digi]] + Eingesetzt wird das System in verschiedenen Konfigurationen und Varianten bereits bspw. bei OE1XAR, OE1XUR, OE2XAP, OE2XGR, OE2XWR, OE2XZR, OE3XAR, OE3XER, OE5DXL, OE5FHM, OE5HPM, OE5XAR, OE5XBR, OE5XDO, OE5XGR, OE5XUL, OE7XGR sowie bei DB0FFL, DB0KLI, DB0WGS, DC9RD, DH2IW, DL3RCG, DL8RDL, DK5RV und IQ3AZ.
- There is also a version for raspberry pi hardware in test, and available soon.	
- ===Software schematic===	+ Weitere Tests laufen unter anderem in weiteren Teilen von OE, sowie in IK, DL und PA.

– [[Datei:Udpboxs.jpg]]		
– ==Help==	+	==Hilfe==
– If you need help on configuring the software packages you can contact OE5DXL on packet radio convers channel 501.	+	Wer Hilfe bei der Konfiguration der Softwarekomponenten benötigt, kann Fragen direkt im Packet Radio Convers auf Kanal 501, oder per PR Mail an OE5DXL stellen.

Aktuelle Version vom 8. Januar 2023, 14:52 Uhr



For english version on this project >>[click here](#)<<

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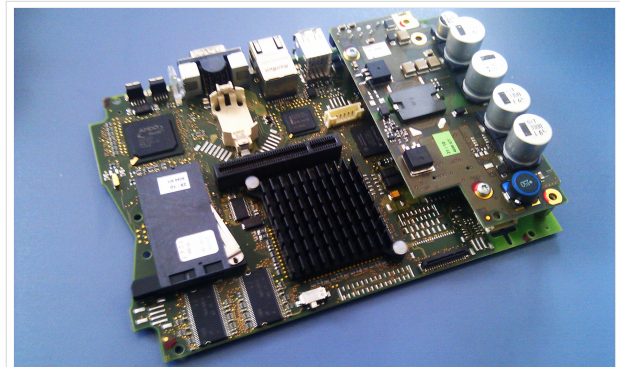
Einleitung

Hierbei handelt es sich um eine Amateurfunk Toolchain, welche bspw. unter Einsatz von [TCE - Tinycore Linux](#) auf Embedded System wie Industrie PC, ALIX u.d.g. Services wie

- [Packet Radio](#) - (Multibaud bspw. 1k2 2k4 4k8 9k6..)
- [APRS](#) - UDPGATE (IGATE, ebenfalls Multibaud bspw. 1k2 und 9k6)
- LoRa APRS (NEU!) inkl. Mic-E
- [SAMNET](#)
- Blitzortung
- Radiosonden RX (Wetterballon)
- kleine Webserver
- Wetterstation mit unterschiedlichen Sensoren
- SVX-Link (Echolink)
- [WINLINK Global Radio E-Mail \(RMS Packet\)](#)
- Schalt- und Meßzentrale

u.v.m. unter anderem im HAMNET anbindet.

Ziel ist ein minimaler Aufwand und minimale Stromaufnahme, bei maximalem Funktionsumfang.



500MHz LowPower Industrie PC

Hardware

[TCE Hardware](#) -> Informationen zur benötigten Hardware

Software

DL1INUX hat dankenswerter Weise in Wiki für dieses Projekt erstellt:

<http://dxlwiki.dl1nux.de>

Einstellungen & Bedienung

Informationen zur Installation, Konfiguration und zu den einzelnen Modulen

Installation & Download

Dieses Kapitel erklärt die Installation vom TCE Image unter dem jeweilig verwendeten Betriebssystem

Einsatz

Eingesetzt wird das System in verschiedenen Konfigurationen und Varianten bereits bspw. bei OE1XAR, OE1XUR, OE2XAP, OE2XGR, OE2XWR, OE2XZR, OE3XAR, OE3XER, OE5DXL, OE5FHM, OE5HPM, OE5XAR, OE5XBR, OE5XDO, OE5XGR, OE5XUL, OE7XGR sowie bei DB0FFL, DB0KLI, DB0WGS, DC9RD, DH2IW, DL3RCG, DL8RDL, DK5RV und IQ3AZ.

Weitere Tests laufen unter anderem in weiteren Teilen von OE, sowie in IK, DL und PA.



DB0WGS APRS & PR Digi

Hilfe

Wer Hilfe bei der Konfiguration der Softwarekomponenten benötigt, kann Fragen direkt im Packet Radio Convers auf Kanal 501, oder per PR Mail an OE5DXL stellen.