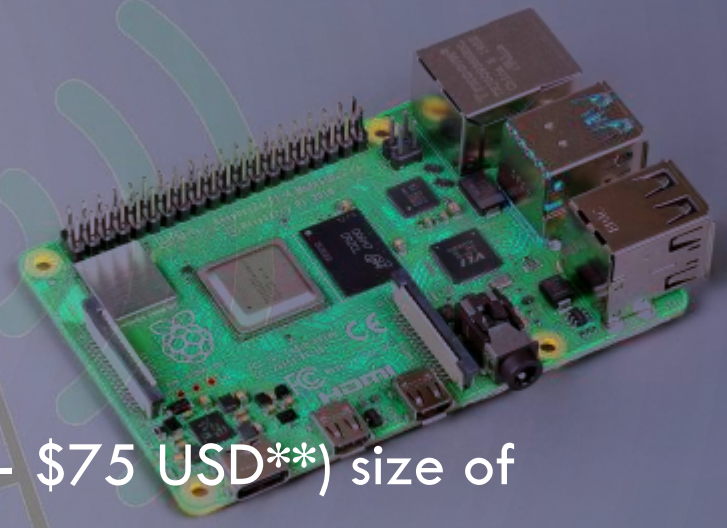
GETTING STARTED WITH HAMPI

BY DAVE SLOTTER, W3DJS

WHAT'S A RASPBERRY PI?

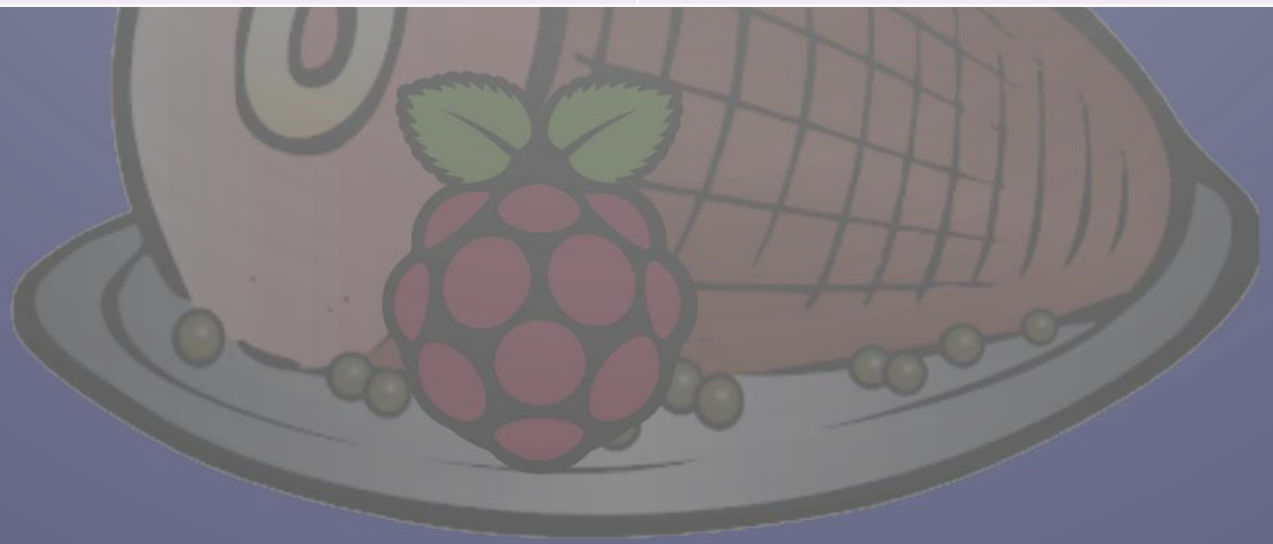


- RPi 4 : low cost completely functional computer ($30 - $75 USD**) size of card deck

CPU (ARM v8)	Micro HDMI
RAM (2GB – 8GB)	Micro SD Card Slot
USB (2x USB 2.0 + 2x USB 3.0)	Audio Jack
Ethernet (Gigabit)	Camera Port
WiFi (802.11ac)	GPIO Header!
Bluetooth (5.0 + BLE)	

WHAT OPERATING SYSTEMS DOES RASPBERRY PI USE?

Raspbian Linux (based on Debian)	LibreELEC
Windows 10 IoT Core	RetroPie
Ubuntu	PiNet
Ubuntu MATE	RISC OS
OSMC	Weather Station



WHAT CAN I DO WITH RASPBERRY PI?

LibreOffice Suite (Word, Sheet, Present)	BitTorrent Server
Chromium (Web Browsing)	Home Automation
Media Player (Living Room PC)	Wireless network printer
Game Emulator	Music Streaming
Robotics	Kids First Computer
Windows 3.0	Computing Cluster
Learn to Program	Weather Station
File Server (NAS)	Ham Radio Station

RASPBERRY PI 4 POWER REQUIREMENTS

- Input voltage of 4.0 V to 5.5 V with absolute max rating of 6V before damage occurs
- Reasonable power range is 4.7 V to 5.25 V
- Power supply recommended provides 3A (15W) with minimum current of 2.5A if USB peripherals consume less than 500mA in total
- Original Pi 4 has non-compliant USB-C power port. This has now been fixed.

WHY USE RASPBERRY PI FOR HAM RADIO?

- Great in the shack or for going portable
- Small form-factor
- Lightweight
- Low power needs
  - Some people even power from solar!
- Uses Linux which is already well supported

WHERE DO I START?

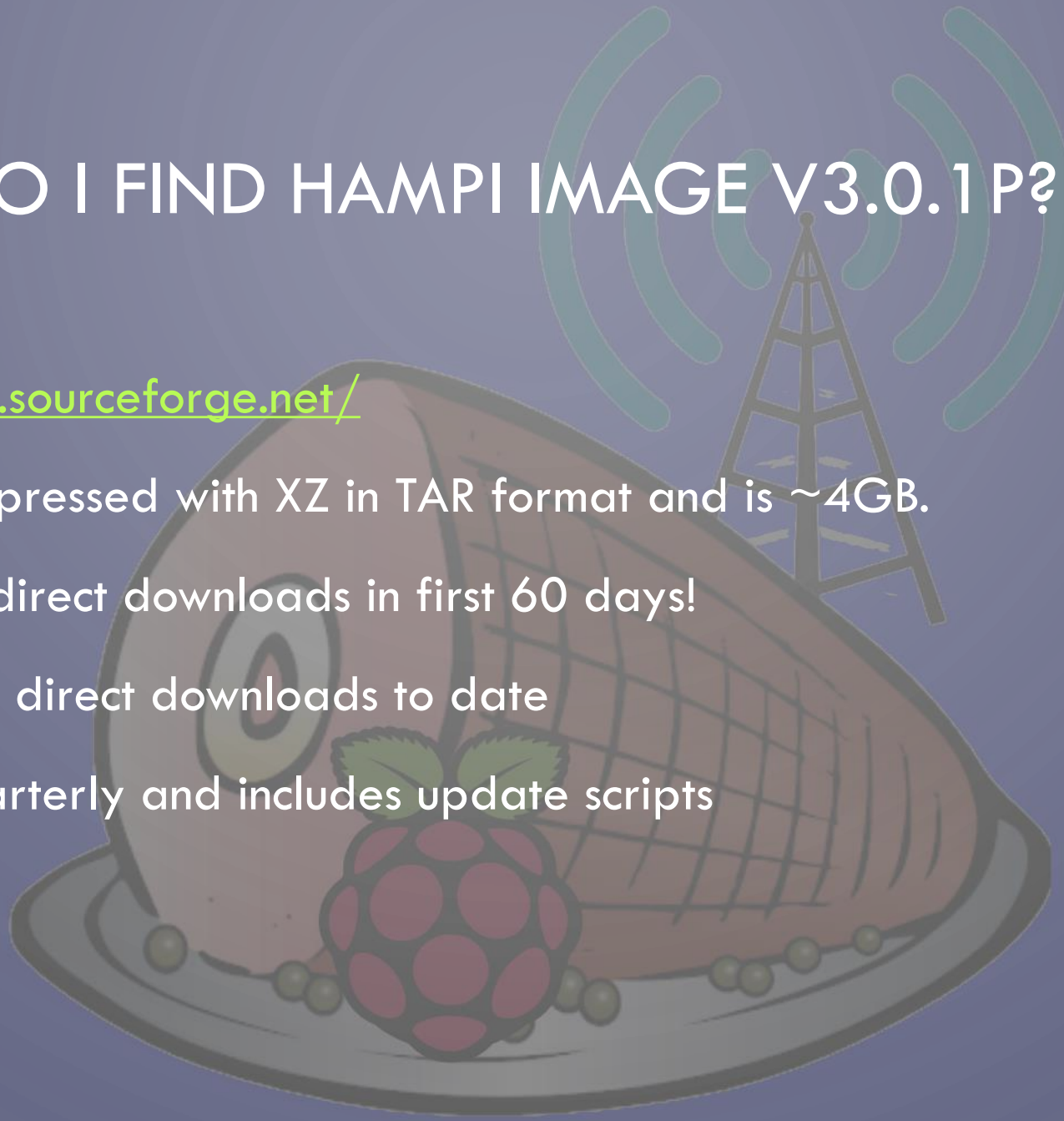
1. Determine needs for Raspberry Pi – will determine equipment
2. Buy Raspberry Pi + power supply + micro sd card from local retailer
    1. Alternatively: SATA SDD + Cable or NVME SSD + NVME USB3 Adapter
3. Reuse USB keyboard, mouse and display. Don't forget the micro HDMI cable!
4. Download software image to flash
    1. HamPi Image v3.0.1p (hampi.sourceforge.net)
5. Download BalenaEtcher for Windows, Mac or Linux & flash micro SD card
6. Plug it all together, insert SD card and watch!

HAMPI IMAGE V3.0.1P

- Custom-built ham radio software image chock full of ~100 applications:
- Created using Ansible, software automation tool.

FlDigi Suite	CHIRP	CQRLog
WSJT-X	BlueDV	wsjtx_to_n3fjp
JS8Call	ADS-B Flight Tracker	Pat WinLink + ARDOP
CubicSDR	NOAA Weather Imaging	CW Applications
GQRX	DX Cluster Client + Server	Ham Test Trainers
Direwolf	Xnecview	GPredict
Xastir	YAAC	Support for SDR Hardware

WHERE DO I FIND HAMPI IMAGE V3.0.1P?



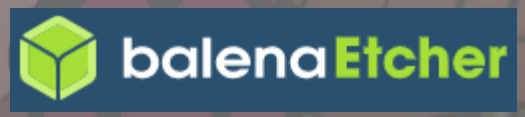
- http://hampi.sourceforge.net/
- Image is compressed with XZ in TAR format and is ~4GB.
- Over 6,000 direct downloads in first 60 days!
- Over **85,000** direct downloads to date
- Updated quarterly and includes update scripts

WHERE DO I GET SUPPORT FOR HAMPI?

- All things HamPi
  - https://linktr.ee/HAMPIW3DJS

HOW CAN I PUT IMAGE ON (MICRO) SD CARD?

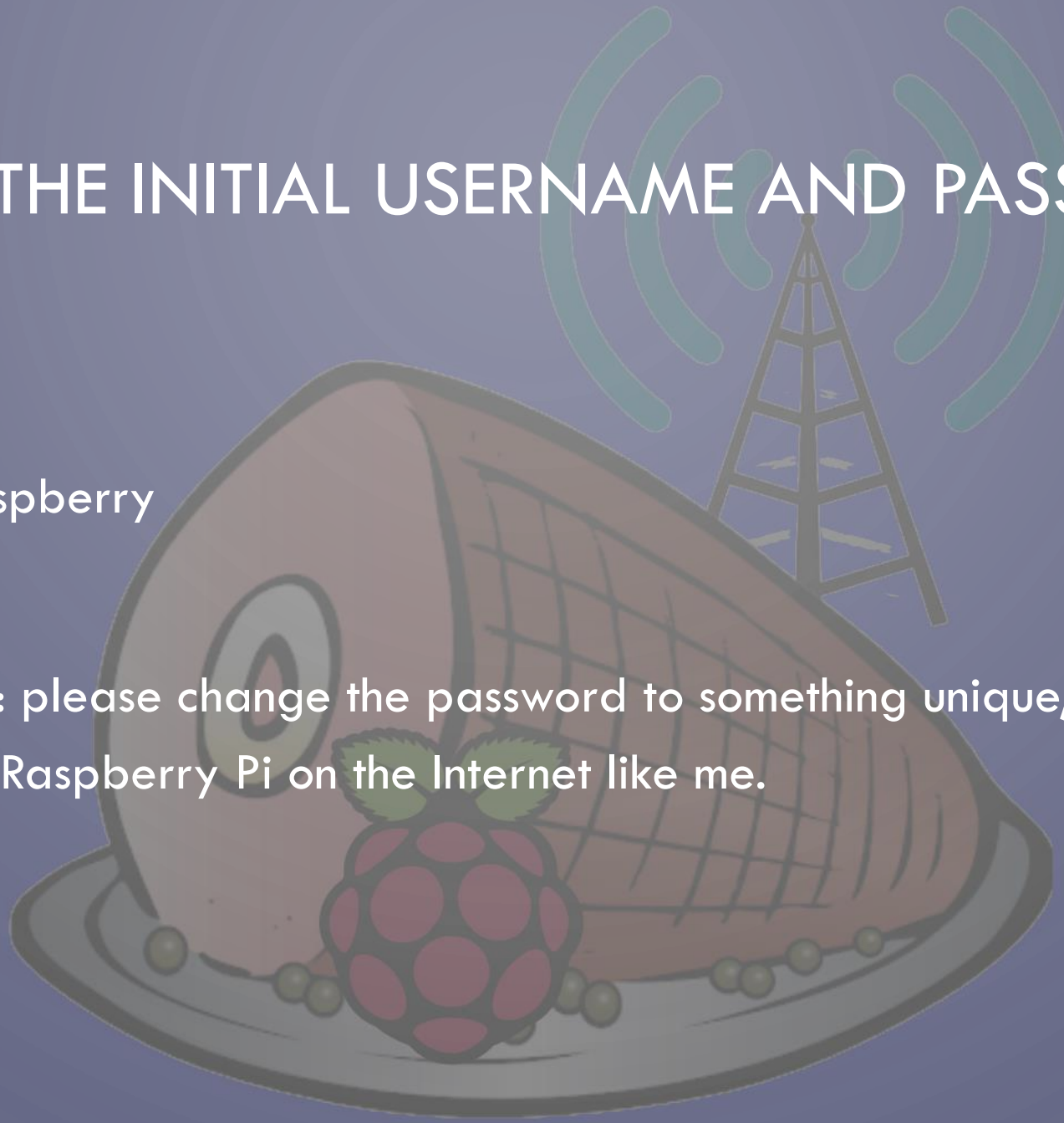
- You just can't copy the image as a file on to the (micro) SD card.
  - (some people have tried – and failed)
- One solution: dd (for Linux)
- But what if I have a Windows PC?
- Solution: BalenaEtcher, available at https://www.balena.io/etcher/



WHAT IS THE INITIAL USERNAME AND PASSWORD?

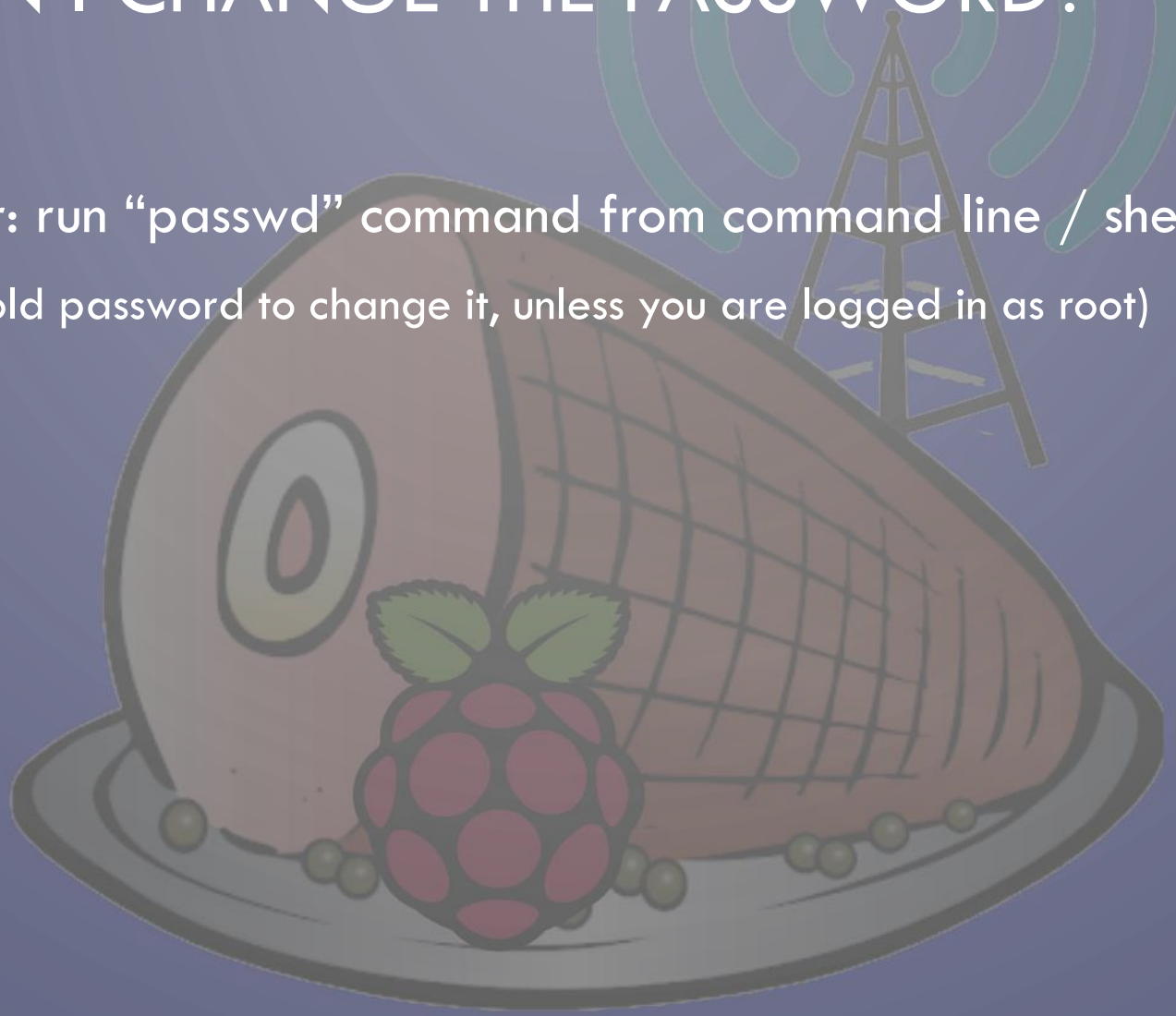
- Username: pi
- Password: raspberry

- Security note: please change the password to something unique, especially if you put your Raspberry Pi on the Internet like me.



HOW CAN I CHANGE THE PASSWORD?

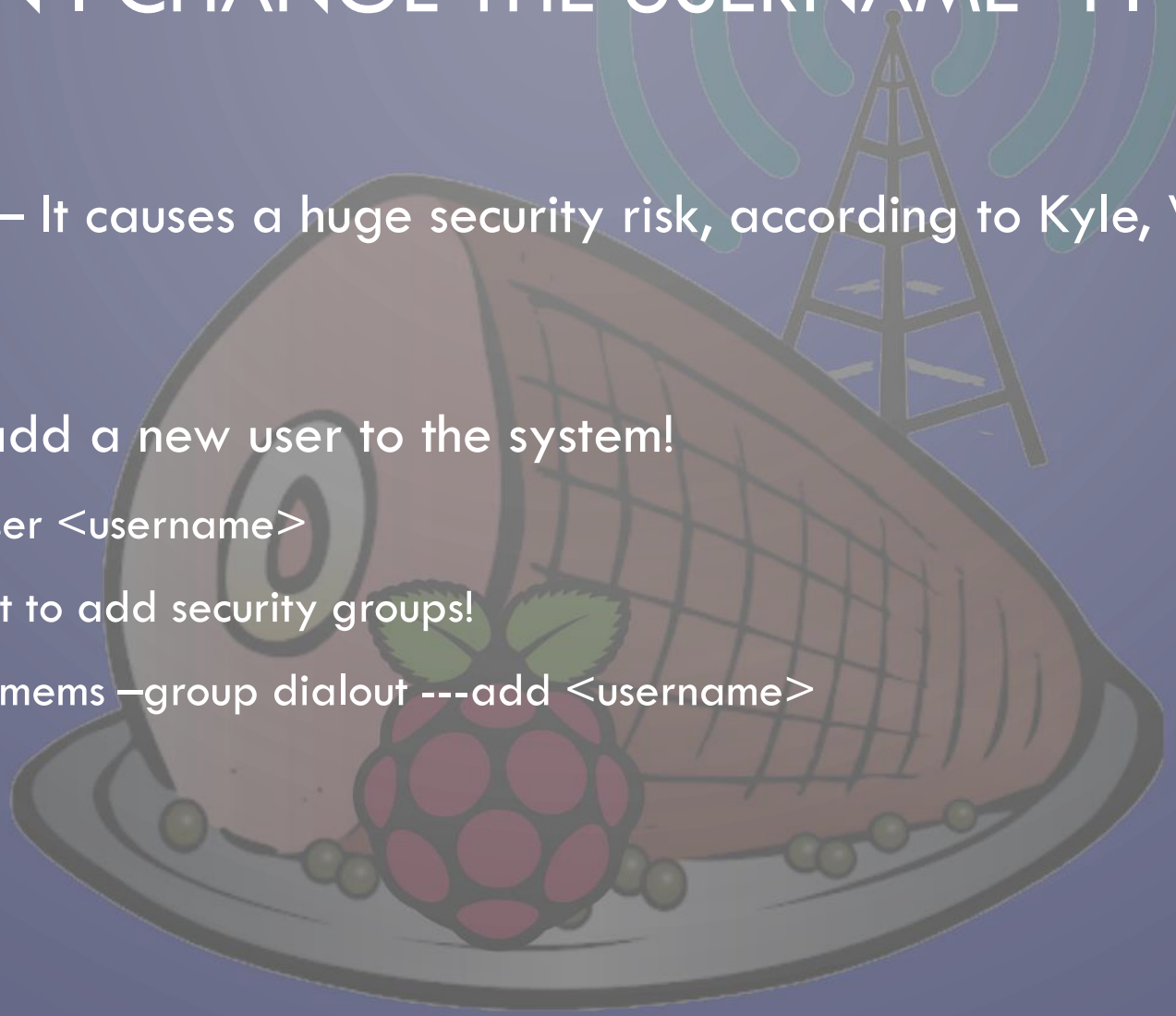
- Quick answer: run “passwd” command from command line / shell
  - (will need old password to change it, unless you are logged in as root)



HOW CAN I CHANGE THE USERNAME "PI"?

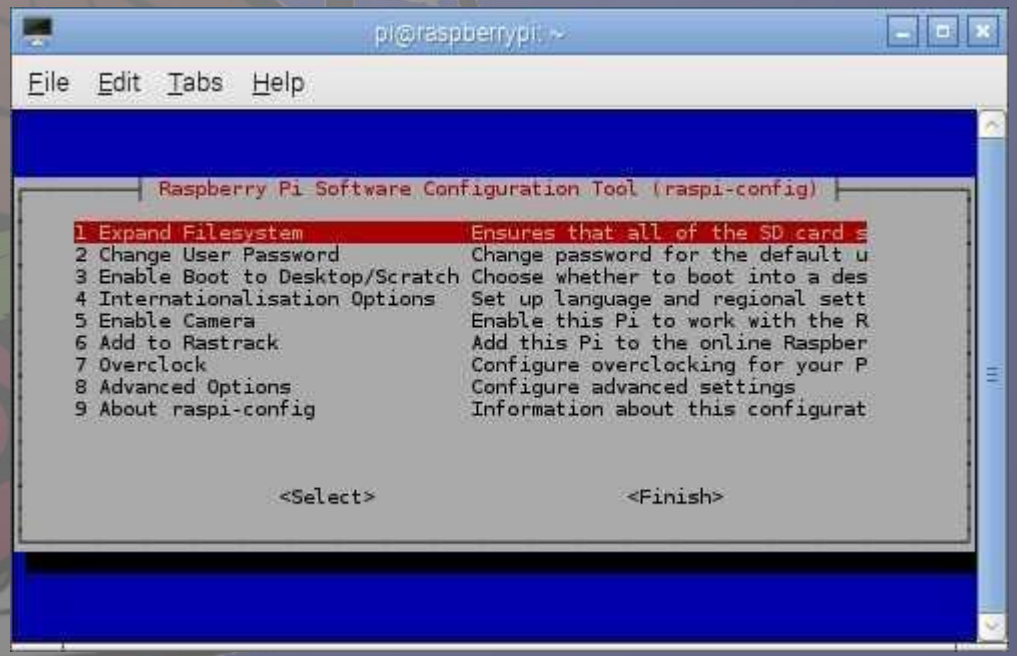
- YOU DON'T – It causes a huge security risk, according to Kyle, W4KDA.

- But you can add a new user to the system!
  - sudo adduser <username>
  - Don't forget to add security groups!
  - sudo groupmems –group dialout ---add <username>



HOW DO I EXPAND THE IMAGE TO USE ENTIRE (MICRO) SD CARD?

- You have a 128GB microSD card and the Pi is only using 16GB. What do you do?
- This is automatic on Raspbian Buster
- On older versions of Raspbian:
  - sudo raspi-config
    - Expand Filesystem



HOW DO I CONNECT THE PI TO MY RADIO?

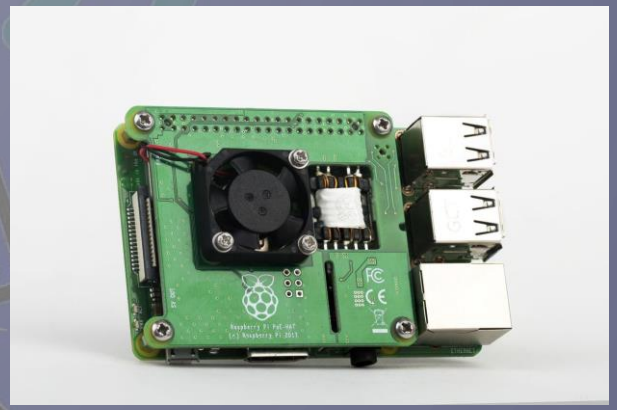
- Short answer: USB
  - Cable from RIG
  - USB Sound Card
    - SignaLink: $135
    - Sabrent USB Sound Adapter $7
- Another short answer:
  DRAWS Ham Radio HAT by
  NW Digital Radio $150

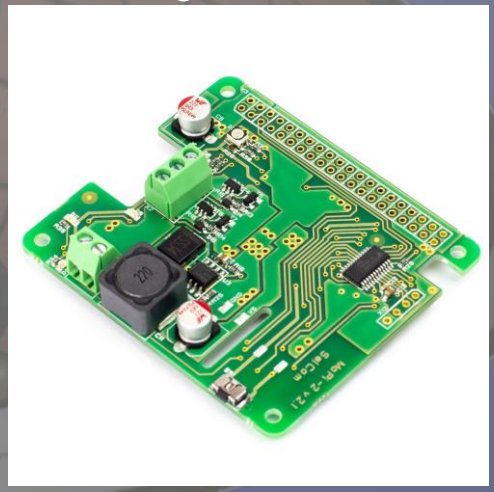
HOW TO KEEP ACCURATE TIME ON THE PI?

- In the Hamshack: use timedatectl and NTP
  - Command: timedatectl
  - Command: ntpdate –q 0.us.pool.ntp.org
  - For more info, see https://raspberrytips.com/time-sync-raspberry-pi/
- In the Field: use GPS receiver & gpsd
  - GLONASS GPS Tracker Module for Raspberry Pi: $8
- Alternative: RTC Module $15
- Alternative: DRAWS Hat GPS Receiver $150

HOW DO I POWER MY RASPBERRY PI?

- In the Ham Shack: Power Adapter aka “wall wart”
- Also in the Ham Shack: Power over Ethernet (PoE) $20
- GPIO Pin #2 (5V) GPIO Pin #6 (GND)
  Dangerous – only use if you know what you’re doing
- Mobile Power – USB Battery Pack $15+
- MoPi 2 – Hot-Swap Mobile Power £29
- PiJuice Solar Panels





HAMPI USE CASE: OPERATING DIGITAL MODES

FlDigi Suite by W1HKJ	**gnss-sdr - GLONASS satellite system Software Defined Receiver**
WSJT-X - Weak Signal (FT8, FT4, etc.) by W1JT	linpsk - amateur radio PSK31/RTTY program via soundcard
GridTracker - Graphical mapping companion program for WSJT-X or JTDX	multimon - multimon - program to decode radio transmissions
JTDX - Alternate client for Weak Signal (FT8, FT4, etc.)	multimon-ng - digital radio transmission decoder
JS8Call - Messaging built on top of FT8 protocol by KN4CRD	psk31lx - a terminal based ncurses program for psk31
JS8CallTools - Get Grid coordinates using GPS	twpsk - a psk program

HAMPI USE CASE: LOGGING

- Software included:
  - TrustedQSL - LotW client from ARRL
  - CQRlog - Ham Radio Logging Application
  - PyQSO - Logging software (written in Python)
  - klog - The Ham Radio Logging program
  - tlf - console based ham radio contest logger
  - tucnak2 - VHF/UHF/SHF Hamradio contest log version 2
  - twlog - basic logging program for ham radio
  - wsjtx_to_n3fjp - Logging adapter to allow WSJT-X to log to N3FJP by yours truly, W3DJS
  - xlog - GTK+ Logging program for Hamradio Operators

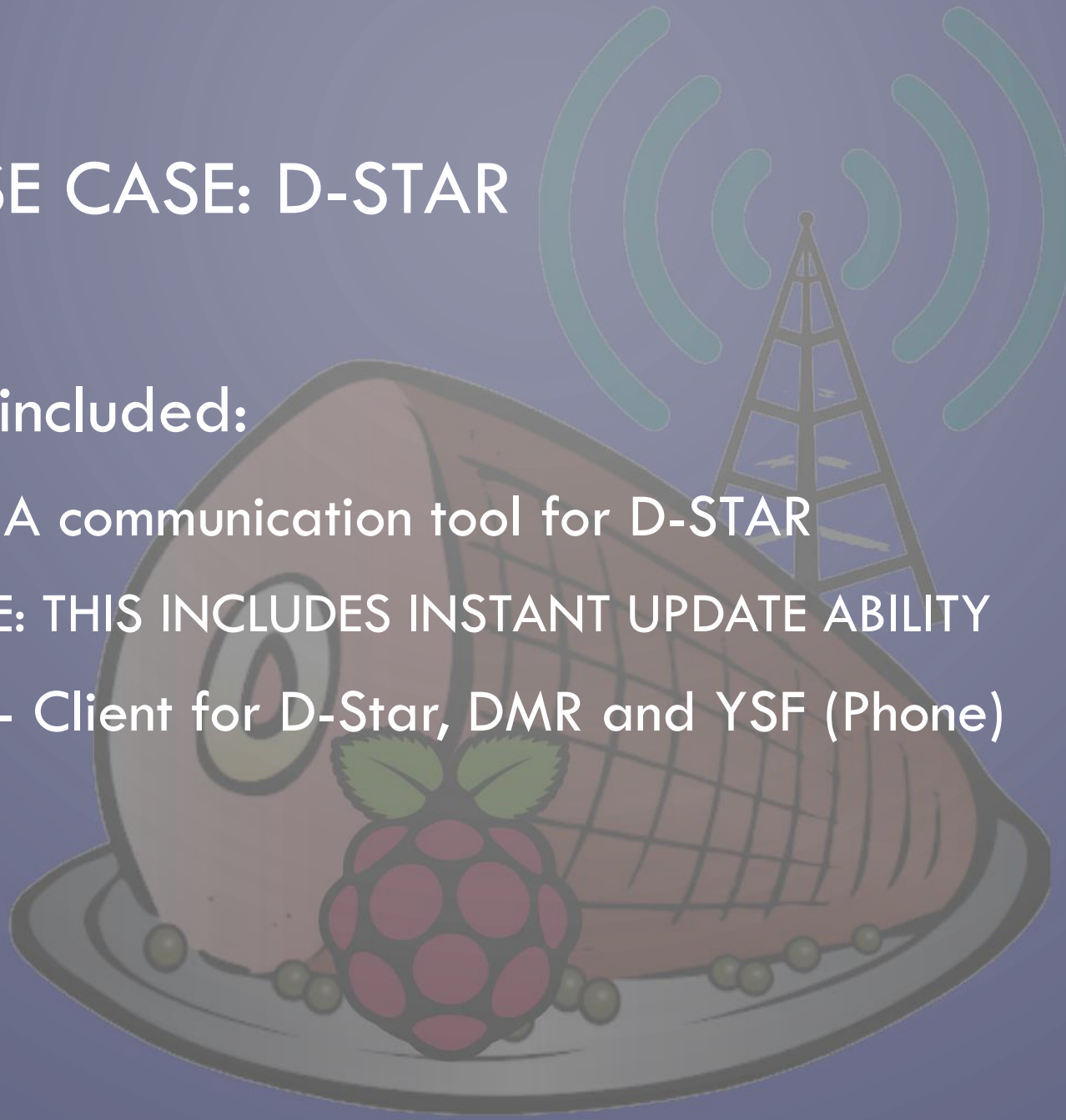
HAMPI USE CASE: APRS

- Software included:
  - Direwolf - Software "soundcard" AX.25 packet modem/TNC and APRS encoder/decoder
  - Xastir - APRS GUI client / Digipeater / Igate
  - YAAC - Yet Another APRS Client
  - APRS Message App for JS8Call
  - aprsdigi - digipeater for APRS
  - aprx - APRS Digipeater and iGate
  - soundmodem - Sound Card Amateur Packet Radio Modems

HAMPI USE CASE: CW / MORSE CODE

aldo - Morse code training program	morse - training program about morse-code for aspiring radio hams
cw - sound characters as Morse code on the soundcard or console speaker	morse2ascii - tool for decoding the morse codes from a PCM WAV file
cwcp - Text based Morse tutor program	morsegen - convert file to ASCII morse code
xcwcp - Graphical Morse tutor program	qrq - High speed Morse telegraphy trainer
cwdaemon - morse daemon for the serial or parallel port	twcw - sends morse code via the sound card or serial card (Needs RTC installed)
ebook2cw - convert ebooks to Morse MP3s/OGGs	xdemorse - decode Morse signals to text

HAMPI USE CASE: D-STAR

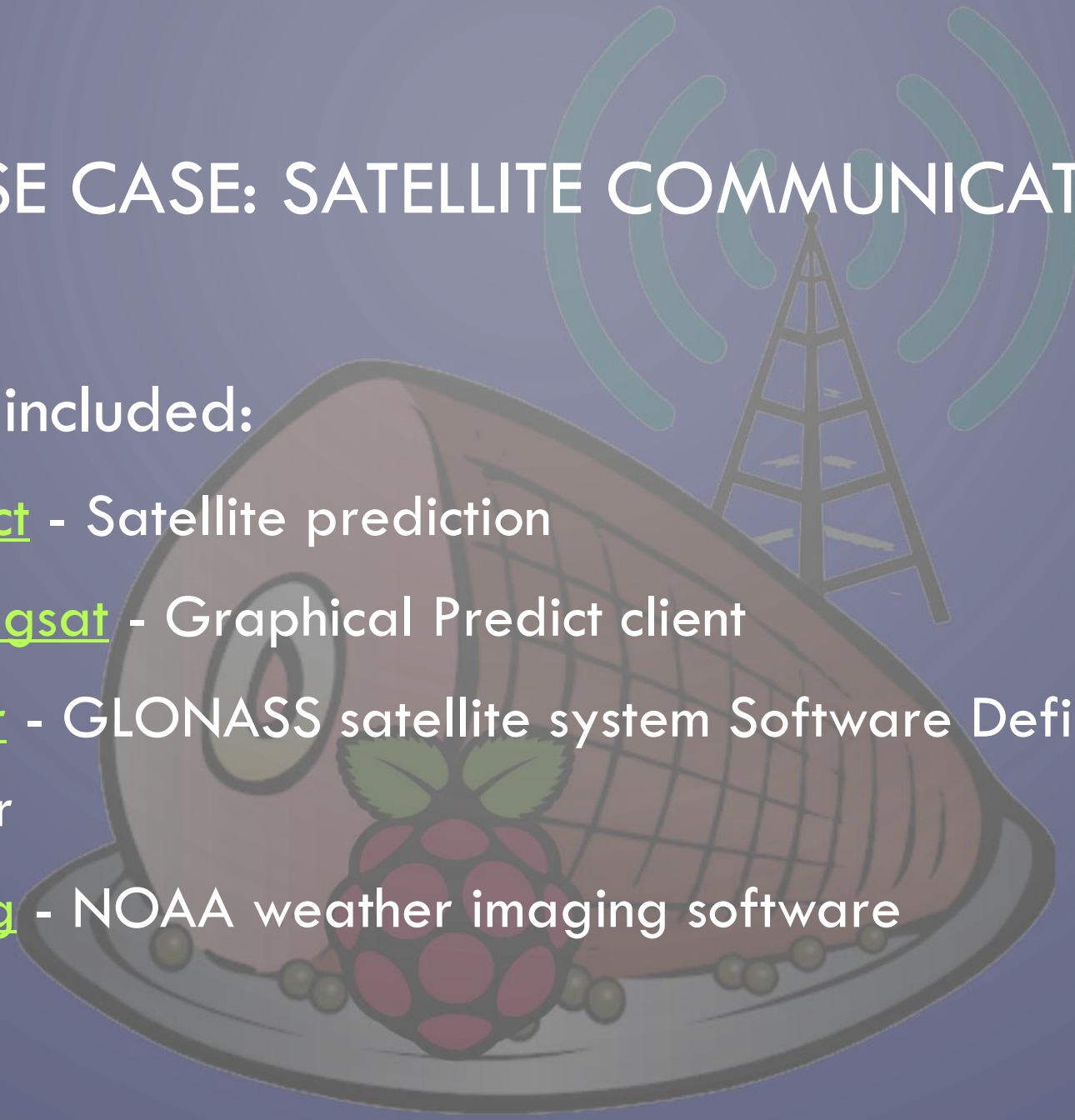


- Software included:
  - d-rats - A communication tool for D-STAR
    - NOTE: THIS INCLUDES INSTANT UPDATE ABILITY
  - BlueDV - Client for D-Star, DMR and YSF (Phone)

HAMPI USE CASE: SOFTWARE DEFINED RADIO (SDR)

CubicSDR - Software Defined Radio receiver	SoapyMultiSDR - Multi-device support module for SoapySDR
cutesdr - Simple demodulation and spectrum display program	SoapyNetSDR - Soapy SDR module for NetSDR protocol
GQRX - Software defined radio receiver	SoapyRemote - Use any Soapy SDR remotely
SDRAngel - SDR player	SoapyRTLSDR - Soapy SDR module for RTL SDR USB dongle
lysdr - Simple software-defined radio	SoapySDR - Vendor and platform neutral SDR support library
quisk - Software Defined Radio (SDR)	SoapySDRPlay - Soapy SDR module for SDRPlay
SoapyAudio - Soapy SDR plugin for Audio devices	
SoapyHackRF - SoapySDR HackRF module	(and More!)

HAMPI USE CASE: SATELLITE COMMUNICATION



- Software included:
  - Gpredict - Satellite prediction
  - predict-gsat - Graphical Predict client
  - gnss-sdr - GLONASS satellite system Software Defined Receiver
  - wxtoimg - NOAA weather imaging software

HAMPI USE CASE: WINLINK / EMCOMM

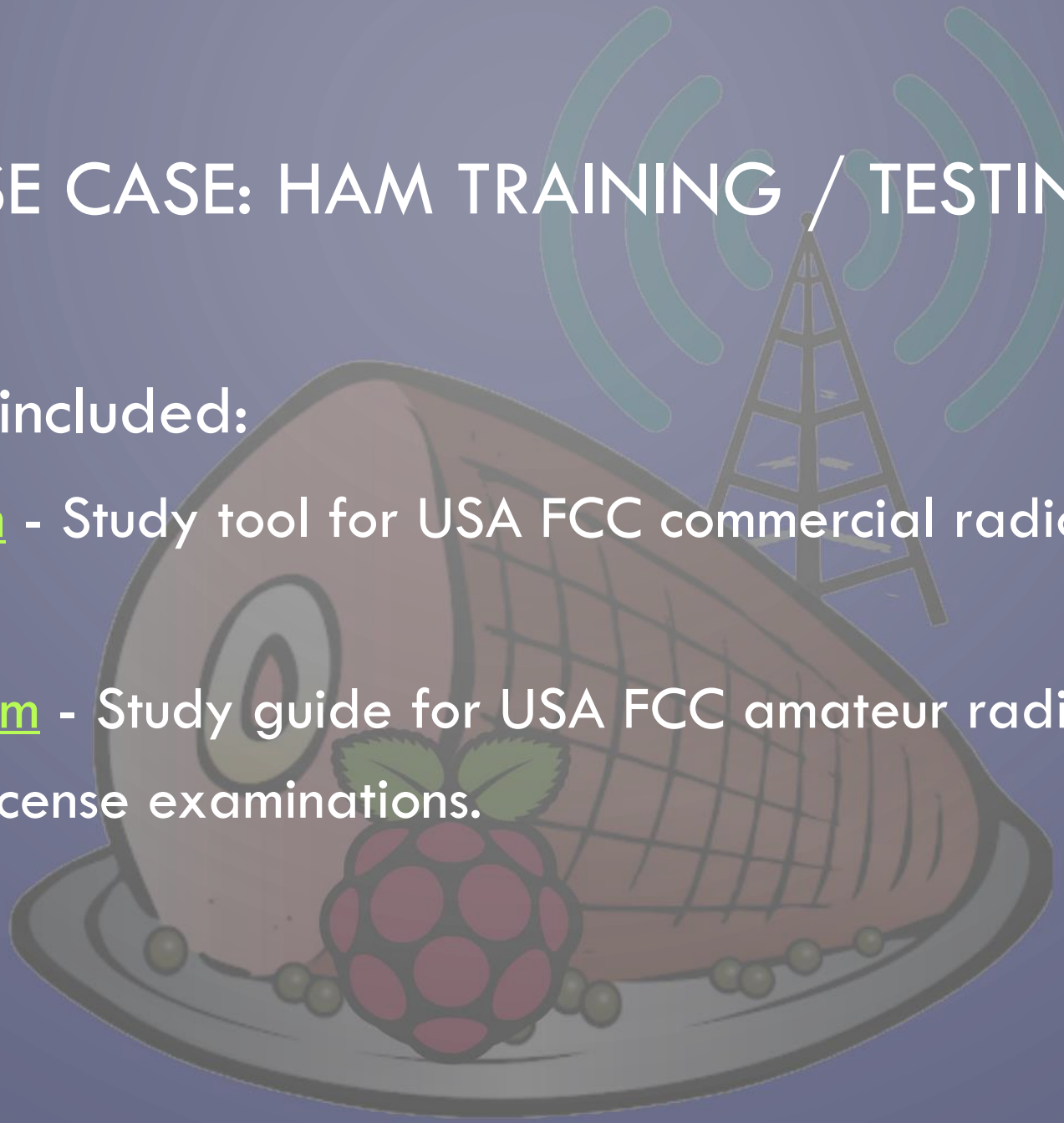
- Software included:
  - Pat WinLink - WinLink for Raspberry Pi (and other platforms)
  - ARDOP support for Pat WinLink
  - ARDOP-GUI - Provides graphical representation of ARDOP connections
  - Find ARDOP - Retrieves local ARDOP sources by KM4ACK
  - AX25 support for Pat WinLink
  - PMON - a PACTOR® Monitoring Utility for Linux

HAMPI USE CASE: ANTENNA MODELING

- Software included:
  - antennavis - Antenna Visualization Software
  - gsmc - A GTK Smith Chart Calculator for RF impedance matching
  - nec2c - Translation of the NEC2 FORTRAN source code to the C language
  - xnecview - NEC structure and gain pattern viewer
  - yagiuda - software to analyse performance of Yagi-Uda antennas
  - VOACAP - HF propagation prediction

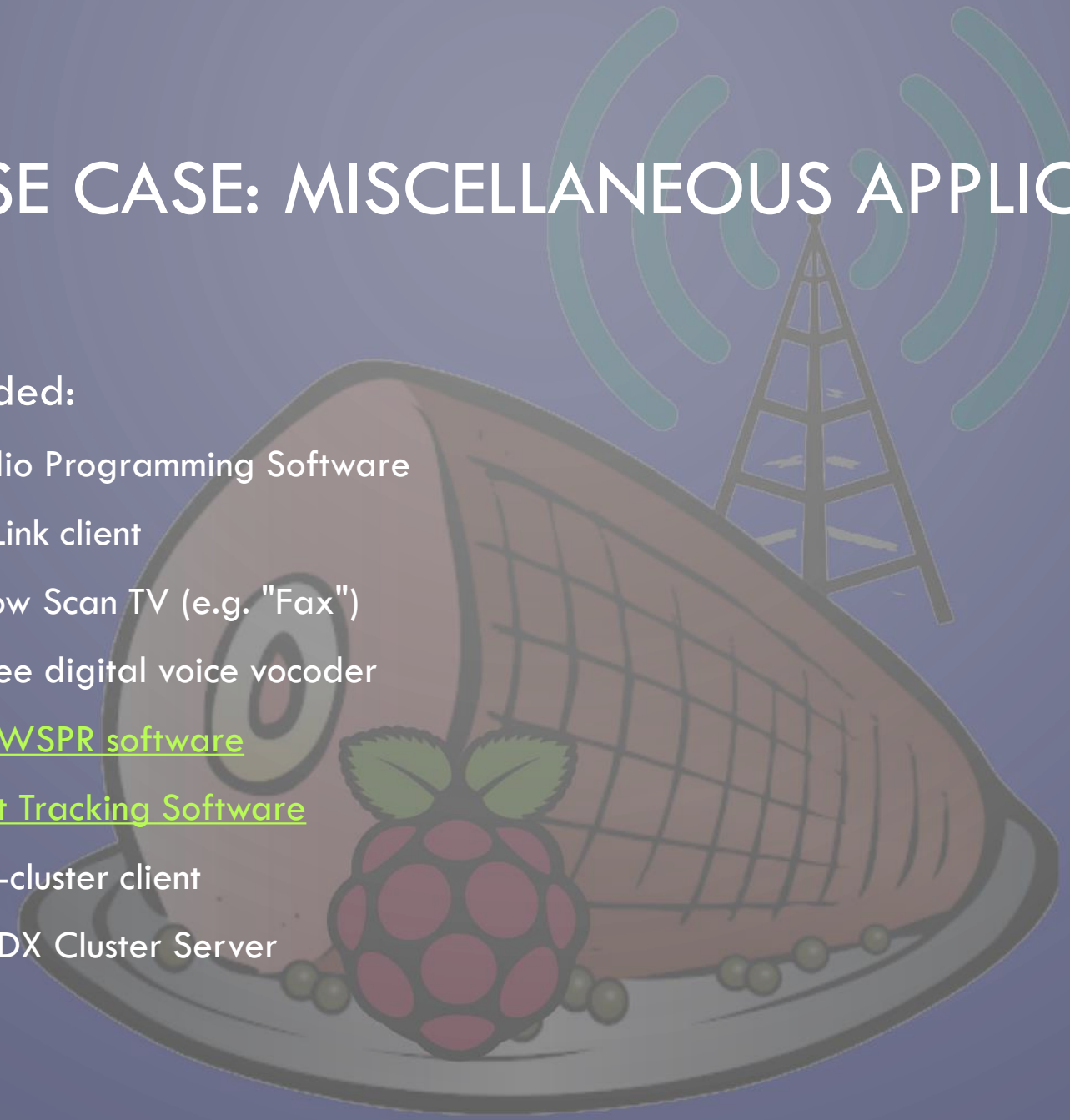
HAMPI USE CASE: HAM TRAINING / TESTING

- Software included:
  - fccexam - Study tool for USA FCC commercial radio license exams.
  - hamexam - Study guide for USA FCC amateur radio (ham radio) license examinations.

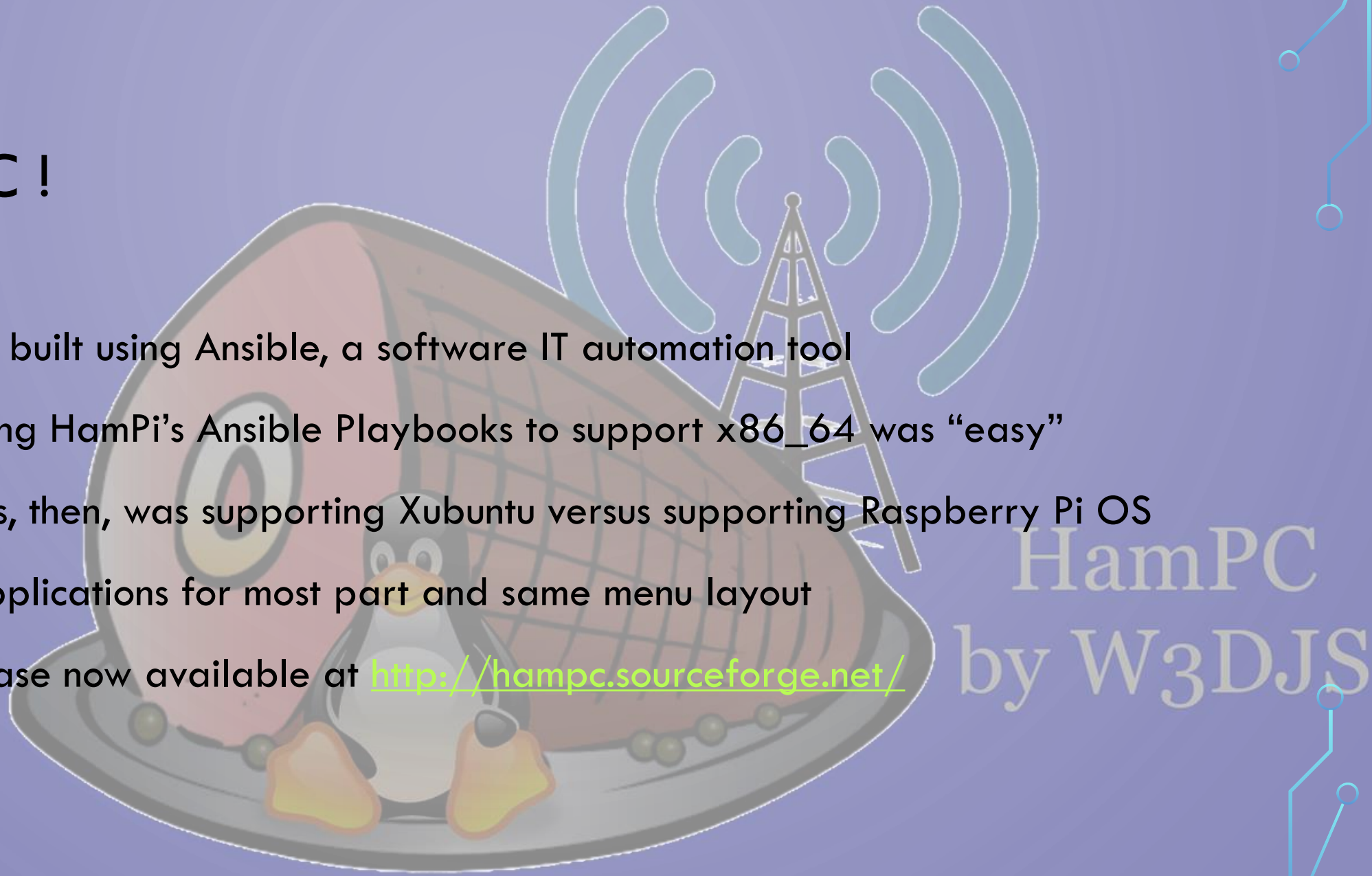


HAMPI USE CASE: MISCELLANEOUS APPLICATIONS

- Software included:
  - CHIRP - Radio Programming Software
  - QTel - EchoLink client
  - QSSTV - Slow Scan TV (e.g. "Fax")
  - FreeDV - Free digital voice vocoder
  - WsprryPi - WSPR software
  - ADS-B Flight Tracking Software
  - Xdx is a DX-cluster client
  - DXSpider - DX Cluster Server



HAMPC !



- HamPi is built using Ansible, a software IT automation tool
- Converting HamPi's Ansible Playbooks to support x86_64 was "easy"
- The focus, then, was supporting Xubuntu versus supporting Raspberry Pi OS
- Same applications for most part and same menu layout
- Pre-release now available at http://hampc.sourceforge.net/

HAMPI SUPPORTS THESE CHARITIES

- TFRM and AFESP – 50/50 Shared Parenting

DEMO + QUESTIONS

- Demo of remote station operation.
  - (Hey, I tested it this morning!)
- RFI sensitivity concerns
  - Use Ferrite chokes