Protected Area Technician Online Learning Journey

INTRODUCTION

- Overview
  - Inspiration for the course
  - Is this course right for you
  - Certifications available
  - Recommended Prerequisites
  - What is a Protected Area Technician
  - Structure of the Career Path
  - How to navigate the CCF Moodle
  - How to use Cisco Networking Academy Links

1 TOOLS FOR INFORMED DECISION MAKING

- Overview
  - Module 1: Conservation Goals, Strategy, and Management Plan
    - Conservation Goals
    - Strategy and Management Plan
    - Protected Area Technologies
    - Available Tools for Protected Area Technologies
  - Module 2: Operations Room at Park HQ
    - What is the Operations Room
    - Different layers of operational capabilities
    - The flow of data from field to HQ
  - Module 3: Connectivity, Communications, and Data Transmission
    - Radio Waves
    - Wireless Backhaul
    - VHF Radio Communications
    - GSM Communications
    - LPWAN Data Transmission
    - Satellite Communications
  - Module 4: Information and Data Capture
    - Observational Reporting
    - Surveillance and Monitoring Tools
    - Tracking Devices (human, wildlife, and vehicle operations)
    - Perimeter Security
  - Module 5: How it all comes together
    - Domain Awareness Systems
    - Data Models
    - System Diagrams
    - Concept of Operations
- Learning Outcomes
  - Module 1:
    - Articulate the goals of conservation initiatives.
    - Develop and evaluate strategies and management plans for protected areas.
    - Identify and assess the use of technologies that support conservation and area protection.
  - Module 2:
    - Describe the purpose and structure of an Operations Room at park headquarters.
    - Understand the layers of operational capability and how data flows from the field to HQ for decision-making.
  - Module 3:
    - Explain various communication technologies used in conservation areas, including VHF, GSM, LPWAN, and satellite systems.
    - Compare the advantages and limitations of different data transmission systems, particularly in remote or challenging environments.
  - Module 4:
    - Identify and use key tools for observational reporting, surveillance, and perimeter monitoring.
    - Understand the application of tracking technologies for wildlife, human, and vehicle movement.
  - Module 5:
    - Understand how individual technologies and systems integrate into a comprehensive Domain Awareness System.
    - Interpret data models, system diagrams, and concepts of operations to support real-time decision-making in conservation efforts.
- Recommended Prerequisites
  - An interest in learning about how technology is being used in protected area management.
  - A passion for nature.

2 INFRASTRUCTURE FUNDAMENTALS

- Overview
  - Module 1: Basic Radio Physics
    - Fundamentals of Radio Physics
    - Link Budgets
    - Path Loss
  - Module 2: Antennas
    - Importance of Antennas
    - How Antennas Work
    - Antenna Properties
    - DIY Antennas
    - Amplifiers
    - Deploying Antennas
- Learning Outcomes
  - Module 1:
    - Explain the fundamental principles of radio physics.
    - Calculate and interpret link budgets and path loss in communication systems.
    - Understand the factors affecting signal propagation and performance.
  - Module 2:
    - Describe how antennas function and their role in communication systems.
    - Evaluate key antenna properties such as gain, polarization, and radiation patterns.
    - Construct basic DIY antennas and understand amplifier use in antenna systems.
    - Plan and implement effective antenna deployment strategies in the field.
  - Module 3:
- Recommended Prerequisites
  - Desirable: A school level understanding of Physics

- Module 3: Electrics and Electronics
  - Basic Electrics and Electronics
  - Charge, Voltage, and Current
  - Resistance - Ohm's Law
  - Power
  - Energy and Work
  - DC and AC
  - Batteries
  - Embedded Computing and Boards
  - Sensors
- Module 4: Power
  - Power Sources
  - Renewable Energy
  - Solar
  - Planning Solar Energy
  - Batteries
  - Charge Controllers
  - Power Management
  - Power Optimization
- Module 5: Telecommunications
  - Clarification of Telecommunications
  - Carrier
  - Location of Infrastructure
  - Scale
  - Wireless Frequency
  - Use Cases
  - Main Criteria Comparisons

- Understand basic electrical concepts including charge, voltage, current, and resistance.
- Apply Ohm's Law to practical problems and compute power, energy, and work.
- Differentiate between DC and AC systems and understand battery technologies.
- Work with embedded computing platforms and integrate sensors for field applications.

Module 4:

- Identify various power sources with a focus on renewable energy solutions.
- Plan and implement solar energy systems including panels, batteries, and charge controllers.
- Apply principles of power management and optimization for efficient energy use in the field.

Module 5:

- Explain the fundamentals of telecommunications and the role of carriers.
- Assess infrastructure needs based on location, scale, and wireless frequency considerations.
- Compare telecommunications options using key criteria and evaluate their suitability for different use cases.

3 NETWORKING THEORY

Overview

- Module 1: Introduction to Networking Technologies in Conservation
- Module 2: Core Track: (Cisco Netacademy)
  - Networking Basics — Available Languages: Arabic, German, English, Spanish, French, Brazilian Portuguese, Romanian, Ukrainian
  - Network Support and Security — Available Languages: Arabic, English, Spanish, French, Brazilian Portuguese
- Module 3: Advanced Track (Cisco Netacademy)
  - Networking Devices and Initial Configuration — Available Languages: Arabic, English, Spanish, French, Brazilian Portuguese, Ukrainian
  - Network Addressing and Advanced Troubleshooting — Available Languages: Arabic, English, Spanish, French, Brazilian Portuguese, Ukrainian

Optional Advanced Courses

Learning Outcomes

Module 1:

- Explain the importance and application of networking technologies in conservation settings.
- Recognize how reliable communication networks support field operations, data collection, and remote monitoring.

Module 2:

- Understand the basics of computer networking, including network types, components, and functions.
- Identify common network support and security practices to ensure reliable and secure connectivity in conservation environments.

Module 3:

- Set up and configure basic networking devices such as routers and switches.
- Apply IP addressing techniques and perform advanced network troubleshooting.
- Understand how to maintain and optimize network performance in the field.

Recommended Prerequisites

- Infrastructure Fundamentals

4 INTERNET OF THINGS (IOT)

Overview

- Module 1: What is the Internet of Things and how is it used in Conservation?
- Module 2: LPWAN and LoRaWAN - an Introduction
- Module 3: LoRaWAN - Introducing Sensors
- Module 4: LoRaWAN - Configuring Sensors
- Module 5: LoRaWAN - Configuring Gateways
- Module 6: LoRaWAN - Connecting Sensors to the Network
- Module 7: IoT - The Application Server and Adding Logic
- Module 8: Other Types of IoT — Coming Soon

Learning Outcomes

Module 1:

- Understand the core concepts and architecture of the Internet of Things (IoT).
- Explore how IoT technologies support data collection, monitoring, and decision-making in conservation.
- Identify real-world examples of IoT applications for wildlife tracking, environmental sensing, and protected area management.

Module 2:

- Explain what Low Power Wide Area Networks (LPWAN) are and why they are suited to remote or resource-limited environments.
- Understand the key principles, advantages, and limitations of LoRa and LoRaWAN technologies.
- Compare LPWAN technologies with other network types used in IoT systems.

Module 3:

- Recognize different types of sensors used in LoRaWAN-based IoT systems.
- Understand how sensors collect and transmit environmental or biological data.
- Match appropriate sensors to specific conservation use cases and environmental conditions.

Module 4:

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking

Learn the process of setting up and programming LoRaWAN sensors for deployment.

Understand configuration parameters such as frequency, spreading factor, and data rate.

Apply best practices for ensuring sensor reliability and efficient data transmission.

Module 5:

Understand the role of gateways in a LoRaWAN network and how they bridge sensors to the internet.

Learn how to install, configure, and connect LoRaWAN gateways to network servers.

Troubleshoot common gateway setup issues related to power, connectivity, and network registration.

Module 6:

Establish secure connections between sensors, gateways, and network servers.

Verify data flow and troubleshoot common connectivity issues.

Understand the use of network servers such as The Things Stack for device management and data routing.

Module 7:

Understand the function of an IoT application server in managing and visualizing data.

Learn how to create logic or rules that trigger alerts, reports, or automated actions.

Explore integration options with dashboards, APIs, and data analytics tools.

Module 8:

Identify and compare alternative IoT technologies such as cellular IoT, satellite IoT, Wi-Fi, and Bluetooth-based systems.

Evaluate when and where these technologies may be preferable to LoRaWAN.

Understand emerging trends and innovations shaping the future of IoT in conservation and environmental monitoring.

5 DEPLOYING NETWORKS AND DEVICES

Overview

- Module 1: Landscapes, Terrain, And Mapping
- Module 2: Tools For Backbone And System Planning
- Module 3: Ground Truthing And Operational Feasibility
- Module 4: Ordering Hardware And Equipment
- Module 5: Monitoring To Keep Your Systems Up And Running
- Module 6: Deploying Iot Devices

Learning Outcomes

Module 1:

Understand how terrain, vegetation, and environmental features influence network coverage and IoT device placement.

Interpret and create basic maps using GIS or mapping tools to plan network layouts.

Identify topographical challenges and assess their impact on radio signals and connectivity.

Module 2:

Learn to design a network backbone suited to field conditions and data needs.

Select appropriate communication technologies (e.g., LoRa, Wi-Fi, cellular, satellite) for specific conservation or remote environments.

Use planning tools and software to model network coverage, capacity, and reliability.

Module 3:

Conduct on-site verification of proposed network layouts using GPS and signal testing tools.

Evaluate real-world constraints such as accessibility, power availability, and line-of-sight.

Adapt network plans to reflect operational realities and field feedback.

Module 4:

Identify and specify appropriate hardware (sensors, gateways, power systems, antennas) based on system design.

Develop equipment lists, budgets, and procurement plans that align with project needs.

Understand compatibility, standards, and quality considerations when sourcing IoT components.

Module 5:

Implement systems for monitoring network performance and device health.

Diagnose and troubleshoot connectivity or hardware failures in the field.

Apply preventive maintenance strategies to ensure system longevity and data continuity.

Module 6:

Prepare and configure IoT devices for deployment in diverse field conditions.

Follow best practices for installation, calibration, and connectivity testing.

Document deployments and establish data collection, communication, and maintenance protocols.

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking
- Internet of Things (IoT)

6 DATA MANAGEMENT AND ANALYSIS

Overview

- Module 1: Introduction
  - Data Management
  - Data vs Information
- Module 2: Data Models
  - Model Modelling
  - Model Creation
- Module 3: Data Capture
  - Data Capture
  - Identifying Trends and Patterns
- Module 4: Data Preparation
  - Labelling
  - Cleaning
  - Filing
- Module 5: Data Storage and Backups
  - Why Data Storage Matters
  - Types of Data Storage
  - Hardware Requirements
  - Software & Databases
  - Common File Formats
  - Backup Strategies
  - Data Security
- Module 6: Data Analysis
  - The OODA Loop
  - Software used in Data Analysis

Learning Outcomes

Module 1:

Understand the principles and importance of data management in conservation technology.

Differentiate between raw data and actionable information.

Recognize the role of data in decision-making and system optimization.

Module 2:

Understand the purpose and structure of data models in conservation systems.

Create basic data models that represent real-world operations and monitoring goals.

Use modeling techniques to organize and interpret complex datasets.

Module 3:

Apply effective methods for capturing data from field devices and manual observations.

Identify meaningful trends and patterns within data streams.

Evaluate the quality and consistency of captured data to inform system improvements.

Module 4:

Clean, label, and organize datasets to prepare for analysis or system integration.

Implement file management practices to ensure data is structured, traceable, and usable.

Understand the importance of accurate data preparation for model performance and decision-making.

Module 5:

Explain the importance of effective data storage for conservation operations and long-term data use.

Compare different types of data storage solutions (e.g., local, cloud, hybrid) and select appropriate options based on project needs.

Identify hardware requirements for storing and accessing field data securely and reliably.

Understand the role of software tools and databases in organizing and managing large datasets.

Recognize common file formats used in conservation data workflows and their advantages.

Design and implement effective data backup strategies to ensure data integrity and recovery.

Apply best practices for data security to protect sensitive information from loss, corruption, or unauthorized access.

Module 6:

Apply basic data analysis techniques to draw insights from conservation datasets.

Learn about different tools available used for analyzing conservation data.

Interpret analytical outputs to support conservation decision-making and reporting.

Communicate findings effectively to both technical and non-technical audiences.

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking
- Internet of Things (IoT)
- Deploying Devices

7 SOFTWARE INTEGRATION AND APIS

Overview

- Module 1: Understanding the world of APIs
  - What is an API
  - Why APIs are essential for data integration
  - Real-world examples
- Module 2: Working with Web Service APIs
  - Web Services and the Internet
  - Understanding API requests
  - Requests and Responses
  - When things go wrong
  - RESTful APIs
- Module 3: Authentication and Security
  - Why APIs require authentication
  - How do you say who you are
  - Where do API keys come from
  - Basic security practices for handling API Keys
- Module 4: API Data Formats
  - How data is structured when sent via APIs
  - JSON (JavaScript Object Notation):
  - JSON Examples
  - CSV (Comma-Separated Values)
- Module 5: Working with GPS Data through APIs
  - Typical GPS data
  - Essential GPS data
  - Challenges
  - Strategies for interpreting GPS data
- Module 6: Practical Examples
  - Popular Tools

Learning Outcomes

Module 1:

Define what an API is and explain its role in data exchange between systems.

Understand the components and basic functions of an API.

Module 2:

Interpret API documentation and understand key concepts such as endpoints, methods, and parameters.

Interpret common HTTP status codes and understand what they indicate about the success or failure of a request.

Interact with RESTful APIs using tools like Postman or command-line requests.

Module 3:

Understand different types of authentication (e.g., API keys, OAuth).

Implement authorization processes to securely access data from APIs.

Module 4:

Identify and work with common data formats returned by APIs (e.g., JSON, XML).

Parse structured data to extract relevant information.

Module 5:

Access and retrieve GPS-based data from tracking or mapping APIs.

Understand the structure and meaning of geospatial data (e.g., coordinates, timestamps, metadata).

Module 6:

Write and execute queries to retrieve real-time or historical data through APIs.

Handle pagination, rate limits, and filters for efficient data access.

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking
- Internet of Things (IoT)
- Deploying Devices
- Data Management

8 CYBERSECURITY

Overview

- CCF Introduction to Cybersecurity
- Introduction to Cybersecurity (Cisco Netacademy)
  - Introduction to Cybersecurity
  - Attacks, Concepts, and Techniques
  - Protecting your Data and Privacy
  - Protecting the Organisation

Available Languages:
Arabic
Indonesian
German
English
Spanish
French
Italian
Japanese
Korean
Dutch
Polish
Brazilian Portuguese
Romanian
Thai
Turkish
Ukrainian

- Module 1: Threats and Impacts
  - What is Cybersecurity and Why it Matters
  - Common Cyber Threats in Conservation
  - The Impact of Cyber Threats on Protected Areas
- Module 2: Risk Identification, Classification and Audit
  - Why do Conservation Organisations need Risk Assessments
  - The 5 Core Steps of a Risk Assessment
  - Steps in a Security Audit
- Module 3: Mitigation Measures and Best Practice
  - The Layered Approach to Cybersecurity
  - Mitigation Strategies for Common Cyber Threats
  - Securing Conservation Networks
  - Creating an Incident Response Plan
  - Sustaining Long Term Cybersecurity

Learning Outcomes

Module 1:

Identify primary cyber threats to conservation organisations.

Explain how threats impact wildlife, conservation teams, and donor trust.

Recognise key cybersecurity principles including the CIA Triad.

Module 2:

Explain the role of a structured Cybersecurity Risk Assessment Framework in conservation.
Identify and categorize critical assets in a conservation environment.

Classify risks based on likelihood and impact using real-world vulnerabilities.

Construct a Cybersecurity Risk Register to track threats and mitigation strategies.

Conduct a security audit using a structured checklist.

Apply risk assessment principles through an interactive network security exercise.

Module 3:

Apply industry best practices to mitigate cybersecurity risks in conservation.

Implement layered security strategies to protect critical conservation assets.

Develop a Cybersecurity Incident Response Plan for handling cyberattacks.

Establish long-term security measures to sustain protection over time.

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking
- Internet of Things (IoT)
- Deploying Devices
- Data Management
- Software Integration and APIs

9 MAINTENANCE AND SUSTAINABILITY

Overview

- Module 1: System Maintenance in Remote Environments
  - Scheduling Maintenance
  - Maintenance Recommendations
- Module 2: Documentation
  - What to log on your maintenance visits
- Module 3: Troubleshooting Conservation Technology
  - What is Troubleshooting
  - Why Troubleshooting Matters
  - Benefits of Troubleshooting
  - The 5 Steps of Troubleshooting
  - Documenting your work

Learning Outcomes

Module 1:

Understand how to schedule routine and preventative maintenance tasks tailored for remote deployments.

Follow recommended best practices for maintaining conservation hardware and systems in field conditions.

Anticipate and mitigate common environmental and logistical challenges during system upkeep.

Module 2:

Identify the key pieces of information that should be logged during each maintenance visit.

Use templates or checklists to ensure consistent and complete documentation.

Understand how proper recordkeeping supports system reliability and knowledge transfer.

Module 3:

Define what troubleshooting is and why it is crucial for conservation operations.

Understand the broader benefits of effective troubleshooting, including reduced downtime and improved system performance.

Apply a structured five-step troubleshooting process to diagnose and resolve technical issues.

Develop habits for clearly documenting troubleshooting steps and outcomes for future reference.

Recommended Prerequisites

- Infrastructure Fundamentals
- Networking
- Internet of Things (IoT)
- Deploying Devices
- Data Management
- Software Integration and APIs
- Cybersecurity

10 MANAGEMENT AND COLLABORATION

Overview

- Module 1: Project Management Basics
  - Project Management Fundamentals
  - Process
  - Adaptive Management
  - Roadmaps and Technology Adaptation Plans
- Module 2: Technology Partnerships
  - Types of Partnerships you may encounter
  - Identify and leverage partnerships
  - Evaluating new partnerships
  - Securing Partnerships
  - Maintaining Partnerships
- Module 3: Engaging Stakeholders for Success (Cisco Netacademy)
  - Business Value of Stakeholders
  - Basic Processes for Determining Stakeholder Needs
  - Techniques for Effective Stakeholder Interactions

Learning Outcomes

Module 1:

Understand the core principles and processes of project management within a conservation technology context.

Apply adaptive management practices to handle evolving field requirements and challenges.

Develop roadmaps and technology adaptation plans aligned with conservation goals.

Conduct effective project scoping and time management for successful project delivery.

Module 2:

Identify different types of technology partnerships relevant to conservation initiatives.

Evaluate, secure, and maintain strategic partnerships that enhance project success.

Leverage the strengths of various partners (e.g., NGOs, tech firms, government) to meet technical and operational needs.

Module 3:

Recognize the importance of stakeholder engagement in conservation tech projects.

Apply structured processes to determine stakeholder needs and expectations.

Use effective communication techniques to build trust and alignment with stakeholders across technical and non-technical backgrounds.

Presented with xmind