



OFFLINE-FIRST COURSE OPERATIONS SOFTWARE

Top Rope Solutions

Complete course operations, without the paperwork.

Sales & Technical Overview

Safety, inspection and operations software for challenge courses, ropes courses and climbing programs.

Part 1 — Product overview for program directors and decision makers

Part 2 — Technical appendix for IT and operations reviewers

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What is in this document

Part 1	Product overview — what Top Rope Solutions does and why programs buy it
1.1	Executive summary
1.2	The problem we solve
1.3	How it works — a day on the course
1.4	Feature overview
1.5	Who it is for
1.6	Outcomes and value
1.7	Rollout and onboarding
1.8	Frequently asked questions
Part 2	Technical appendix — architecture, data, security and status
2.1	Architecture overview
2.2	Offline-first behaviour and sync
2.3	Data model
2.4	Security and access control
2.5	Data handling, backup and retention
2.6	Reporting and export
2.7	Integrations and API posture
2.8	Implementation status

About this document

The platform described here is in daily production use managing a working challenge course — equipment checks, pre-use assessments, periodic inspections, rope wear tracking, training records, group sessions, medical forms and incident reporting are running software, not specifications.

Top Rope Solutions is that platform, available to your program as a hosted service or a dedicated deployment of your own. Section 2.8 states the status of each module plainly. Commercial terms are provided on request and are deliberately not quoted here.

Executive summary

Top Rope Solutions is safety and operations software for challenge courses, ropes courses and climbing programs. It replaces paper inspection forms, binders and one-off spreadsheets with a single digital record of equipment, course elements, inspections, rope wear, staff training, group sessions, participant medical information and incidents.

The product is built offline-first. Staff capture assessments and session records on a phone or tablet at the element itself — in a canyon, under tree cover, at the far end of the property — with no connection required. Records are stored on the device immediately and synchronise to the cloud automatically once the device is back in range. Nothing is lost waiting for signal, and nobody has to re-key paper notes at the end of the day.

The result is a permanent, timestamped, audit-ready operating record that a program director can produce on demand — for an ACCT or ANSI-aligned review, an insurance renewal, a parent enquiry or an incident investigation — without hunting through filing cabinets.

In one sentence

Top Rope Solutions gives challenge course operators one reliable, offline-capable system for gear, ropes, inspections, training, sessions and incidents — so the paperwork takes care of itself and the records are always ready.

	Before	With Top Rope Solutions
Daily inspections	Paper form, filed later (or not)	Captured at the element, timestamped, permanent
Rope wear	A tally sheet in a shed, if it is kept at all	Loads accrue automatically from logged sessions
Gear retirement	Noticed at audit time	Flagged against the load guideline before it is reached
Staff currency	Memory and a spreadsheet	Who is current, who is due, at a glance
Producing records	Hours of searching	A filtered report in minutes
No connectivity	Work stops or moves to paper	Work continues; syncs later

The problem we solve

Programs running challenge courses carry real safety obligations and real documentation burden. The failure modes are consistent across the industry:

- Paper inspection forms that get lost, rained on, or never filed — leaving gaps in the record exactly where a reviewer will look.
- Spreadsheets only one person understands, which stop being maintained the moment that person moves on.
- No signal on the course, so the record is written from memory hours after the check happened.
- Rope load counts kept on a clipboard, so wear is estimated rather than known.
- Expired or retired gear that goes unnoticed until an audit — or until it is in service on a participant.
- Training records scattered across email, binders and a whiteboard, so nobody can say with certainty who is current on which element.
- Medical information that is either locked in an office when it is needed on the course, or carried around insecurely.

Why generic tools fail here

Generic checklist apps and form builders assume connectivity and assume an office. A challenge course is the opposite: the work happens outdoors, at height, in gloves, frequently out of range, and the record it produces has to survive scrutiny years later. Top Rope Solutions is designed for that environment first and the office second.

How it works — a day on the course

1. Open up	A staff member opens the app on a phone or tablet. The full course — elements, operating systems, rope and equipment registries, the day's groups — is already on the device from the last sync, so it loads with or without signal.
2. Pre-use assessment	They walk the course and complete the daily pre-use assessment element by element, covering operating systems, structures, equipment and the environment. Each item is checked off at the element, with notes and photos where something needs attention.
3. Gear and rope check	Ropes are selected from the rope register, which already shows each rope's accrued load count and flags any rope that has reached the retirement guideline. A rope taken out of service is retired against a reason, and the retirement is recorded and reversible.
4. Run the session	The group is logged: people, staff, elements used and headcount. Participant medical information is available on the device to the staff who need it. Rope loads for the session accrue from the headcount against the elements used.
5. Record what happened	Incidents and near-misses are captured against the session, the element and the people involved, alongside the facilitator's own reflections on how the session ran.
6. Training as it happens	In-service training delivered that day is logged against the staff who attended, updating their currency immediately rather than at the end of the season.
7. Sync and report	Back in range, the device syncs. The office sees the day's assessments, sessions and issues, and can generate a PDF or HTML report and share it by email.

Feature overview

Course elements & operating systems	Document each course element and the operating procedures that go with it, so the procedure lives beside the element rather than in a binder.
Pre-use assessments	Daily assessments covering beginning and end of day, operating systems, structures, equipment and environment — completed on the course with no signal required.
Periodic inspections	Full inspection reports across systems, zip lines, equipment and applicable standards, with photos, findings and a written summary.
Rope log & wear tracking	A register of every rope with its location and status. Load counts accrue automatically from logged sessions and are always derived from history rather than a mutable counter. Ropes reaching the load guideline are flagged for retirement review.
Rope retirement records	Retire a rope against a fixed reason list with notes and author. Retirements are permanent history and can be reversed if a rope is returned to service.
Equipment checks	Equipment recorded and checked within assessments and inspections, with a managed list of equipment types shared across the program.
In-service training records	Log staff training as it happens — delivery approach, systems covered, verifiable items and attendees — and produce a training report per session.
Groups, sessions & people	Record participant groups, the people in them, the staff running the session and the elements used, tied to the rope and equipment involved.
Medical forms	Collect and access participant medical information securely, available offline to authorised staff, with per-person profiles and reporting.
Incident reporting	Capture incidents and near-misses against the session, element and people involved, with the surrounding operating context already linked.
Facilitator reflections	Structured post-session reflections captured alongside the operating record, so programme quality is documented as well as safety.
Photos & voice notes	Attach captioned photos captured on-device, and dictate notes by voice where typing in gloves is impractical.
Participation hours	Hours per person across any date range, with roles and record counts, exported as CSV for payroll, billing or a funder's report.
Reports	Generate PDF or HTML reports per record type, share them by email and keep the whole team — and your reviewers — on the same page.
Backup & recovery	Automated report backups to cloud storage and Google Drive, a recycle bin for deleted records, and administrative recovery tools.
Built for the field	Offline-first by design, installable to the home screen. Everything works without a connection and syncs automatically when the device is back in range.

Who it is for

Top Rope Solutions is built for organisations that own or operate course elements and are accountable for how they are inspected, maintained and used.

- Summer and residential camps running high and low elements, climbing walls and zip lines.
- Guest ranches and resorts offering adventure programming alongside other activities.
- Schools and universities with challenge courses used for teambuilding and outdoor education.
- Outdoor education centres delivering multi-day programs to rotating groups.
- Adventure and therapeutic programs where session and participant documentation is part of the service.
- Course inspectors and managers who oversee several sites and need consistent records across all of them.

Primary roles inside the customer

Program / course director	Owns safety and compliance. Buys the product. Needs records on demand.
Course manager or lead facilitator	Runs the daily assessments and assigns staff. Lives in the app.
Facilitators and instructors	Capture assessments, rope logs, sessions and incidents in the field.
Administrator / registrar	Handles participant forms, medical information and reporting.
IT or operations reviewer	Evaluates security, data handling and device requirements. See Part 2.

Outcomes and value

Outcome	What changes	Who feels it
Audit-ready at any time	Every assessment, inspection, training record, rope retirement and session is timestamped and retrievable by date, element or person.	Director, insurer, reviewer
Rope wear becomes evidence	Load counts accrue from the sessions actually run, so retirement decisions rest on a record rather than an estimate.	Director, insurer
Less administrative time	Records are captured once, in the field, instead of written on paper and re-keyed in the office.	Course manager, admin
Fewer missed checks	Scheduled assessments and rope load thresholds surface themselves rather than depending on memory.	Whole program
Continuity through staff turnover	Procedures and history live in the system, not in one long-serving employee's head.	Director
Faster, better incident response	The element, equipment, staff and session context around an incident are already linked.	Director, legal, insurer
Work never stops for connectivity	Field staff are never blocked by a dead zone; the record is captured where the work happens.	Facilitators

Building the case for your program

Value is best grounded in your own numbers rather than industry averages. The figures worth capturing before a decision: the number of elements assessed daily, minutes spent per paper inspection, hours per week spent filing and re-keying, hours spent preparing for the last audit, and the cost of the last gear item retired later than it should have been.

Rollout and onboarding

What a program needs to start

- A list of course elements and their operating systems.
- Your rope and equipment lists (a spreadsheet is fine — it can be imported).
- Your existing inspection checklists, so they can be reproduced as digital forms.
- A staff roster with roles.
- One phone or tablet per field team, plus a browser for office users.

Typical sequence

Discovery	Review your current inspection forms, rope and gear lists, and reporting obligations.
Configuration	Elements, operating systems, inspection templates, rope locations and user roles are set up to match how your course actually runs.
Data import	Rope and equipment registers and the staff roster are loaded. Historic records are imported where available, and existing rope load counts can be carried over.
Pilot	One course or one team runs a full cycle in parallel with existing paper for a short period.
Full rollout	Remaining staff onboarded; paper retired. Training is short — the field app is deliberately simple.

Commercial terms

Pricing, contract options and support terms depend on the size of your program and whether you want the hosted service or a dedicated deployment. They are quoted directly rather than stated here — get in touch at info@topropesolutionz.com.

Frequently asked questions

What happens if a device has no signal all day?

Everything continues to work. Assessments, rope logs, sessions and notes are stored on the device and queued. When the device reconnects, the queue syncs automatically. Staff do not need to do anything different.

What if two people edit the same record offline?

Records are written with stable identifiers and conflict-safe sync, so a retried or duplicated upload does not create duplicate rows. Writes are checked against the record's last known state, and conflicts are recorded rather than silently resolved.

How is a rope's load count calculated?

It is derived from the rope's use history every time it is displayed, never stored as a counter that could drift. Corrections do not delete history: a changed entry is voided with a timestamp and reason and a fresh entry written, so the trail always shows what was originally logged.

Does the system retire ropes automatically?

No, and deliberately so. The system tracks loads and flags a rope once it reaches the retirement guideline, but retiring a rope is a human decision recorded against a reason, an author and a timestamp.

Does this replace our inspection procedures?

No. It reproduces the procedures you already use as digital forms and keeps the record. Your standards, frequencies and sign-off requirements stay yours.

Who can see participant medical information?

Access is restricted by role and enforced in the database rather than only in the interface. Field staff see what they need for the session they are running; broader access is limited to administrators. See section 2.4.

Can we get our data out?

Yes. Reports export as PDF or HTML, and the underlying records can be exported in a structured format. Your data remains yours.

What devices are supported?

Any modern phone, tablet or laptop with a current browser. The app installs to the home screen and there is no requirement for a specific vendor or operating system.

Does it work for multiple sites?

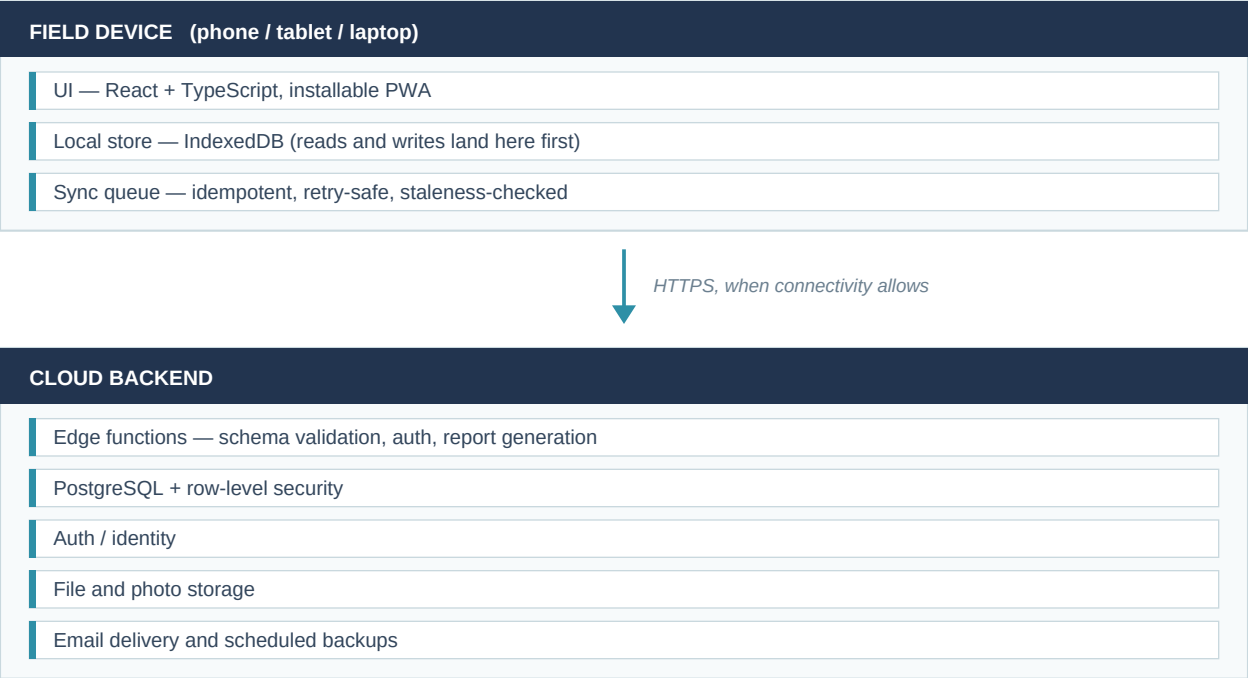
Yes — multi-site organisations can keep separate course records with consolidated reporting across them.

How long does it take to get running?

A program with its element list, rope register and checklists ready can be configured and piloted quickly; the main variable is how much historic inventory, rope-use and training data you want imported. A timeline is agreed during discovery.

Architecture overview

Top Rope Solutions is a web application delivered to the browser and installable to the home screen, with a local-first data layer on the device and a managed cloud backend. There is no app-store install and no on-premise server to maintain.



Client	React with TypeScript throughout, built with Vite and styled with Tailwind CSS. Delivered as a progressive web app with a service worker, so it installs to the home screen and starts without a network.
Local store	IndexedDB on the device holds the working set — elements, ropes, equipment, templates, the day's groups — so the app is fully usable with no connection.
Server logic	Edge functions validate input against explicit schemas before any write, and handle report generation, email delivery, backups and scheduled checks. Public endpoints verify their caller before processing a payload.
Database	Managed PostgreSQL with row-level security policies enforced at the database, not only in application code.
Hosting	Managed serverless runtime; no customer-managed infrastructure and no servers for your IT team to patch.

Offline-first behaviour and sync

Offline behaviour is the defining technical requirement of this product, so the design assumes operations will be interrupted, retried, duplicated and replayed out of order.

Principles

- **Local write first.** A field action is committed to the device store and is immediately visible and durable. Network success is not a precondition for the record existing.
- **Stable logical identifiers.** Records are created with client-generated stable IDs, so replaying an upload references the same logical record rather than creating a second one.
- **Idempotent, conflict-safe writes.** Uploads use upsert semantics keyed on the logical ID, so a retry after a timeout is harmless.
- **Staleness checks on write.** A write carries the record's last known state and is rejected if the server has moved on, so a device returning from a long offline period cannot silently overwrite newer work. Rejections are logged rather than discarded.
- **Explicit sync state per record.** Every record tracks when it was last synchronised against when it was last changed, so pending work is identifiable rather than inferred.
- **Ordered queue with backoff.** Pending operations are queued and retried with backoff; a single failing item does not block unrelated work indefinitely.
- **No silent data loss.** Nothing is removed from the queue until the server acknowledges it. Pending and failed items are surfaced to the user rather than discarded.
- **Append-only history for safety records.** Rope uses, inspections and incidents are corrected by voiding and superseding entries rather than in-place overwrites, so the original record survives with its author and timestamp.

What a reviewer should verify

Ask to see: an assessment completed in airplane mode and its arrival in the cloud after reconnection; a forced duplicate upload producing one row rather than two; a rope-use correction leaving the original entry visible as voided; and the pending-items indicator on a device that has been offline for an extended period.

Data model

The domain model is organised around the course and the records that must be defensible years later.

Entity	Holds	Key relationships
Organisation / site	Program identity, members, settings	Owns all other records
Course element	Element identity, type, whether it uses ropes, active status	Referenced by assessments, sessions and rope uses
Operating system	Procedures and operating parameters for an element	Attached to elements; covered in assessments and training
Rope	Name, colour, location, in-service or retired status	Accrues rope uses; subject to retirements
Rope use	Element, loads added, source record, session date, void state	Belongs to a rope; derived from a group or in-service record
Rope retirement	Reason, note, author, timestamp, optional return to service	Belongs to a rope; permanent history
Equipment item / type	Equipment recorded and checked within reports	Referenced by assessments and inspections
Daily assessment	Beginning and end of day, operating systems, structures, equipment and environment checks, photos	References elements, equipment and staff
Inspection	Systems, zip lines, equipment, standards, photos, summary	References elements and equipment
Staff member	Role, permissions, profile	Linked to training, assessments, sessions
Training record	Delivery approach, systems covered, verifiable items, attendees, summary	Linked to staff and operating systems
Group / session	Group, date, staff, elements used, headcount	Central operating record; drives rope uses
Person	Identity and group membership	Linked to records and medical forms
Medical form	Participant health information and entries	Restricted access; linked to a person
Incident	What happened, actions taken, follow-up	Linked to session, element and people
Reflection	Post-session facilitator reflection	Linked to the session
Report	Generated PDF/HTML outputs and their backup state	Derived from all of the above
Audit log	Author, timestamp and change history for safety-relevant writes	Spans operational tables

Security and access control

Authentication	Email and password with managed identity, plus Google sign-in. No anonymous access to operational data. Sessions are token-based and expire.
Authorisation	Roles are stored in a dedicated roles table, never on the user profile, and are evaluated server-side through database functions. Client state cannot be edited to gain privileges.
Row-level security	Every operational table enforces row-level security in PostgreSQL. A request carries the caller's identity, and the database — not the front end — decides what rows are visible. Policies fail closed: no matching policy means no access.
Privileged actions	Sensitive operations such as retiring a rope or amending another user's record are restricted to supervisors and administrators by policy, not by hiding a button.
Least privilege	Privileged, RLS-bypassing credentials are used only in narrow server-side paths and are never exposed to the browser.
Sensitive data	Participant medical information is treated as the most restricted class: access is limited by role and scoped to the staff who need it for the session they are running.
Transport	All traffic is HTTPS. Data at rest is encrypted by the managed database and storage providers.
Input validation	Every server function validates its input against an explicit schema before any write.
Auditability	Safety-relevant records carry author and timestamp and are superseded rather than silently overwritten, with an audit log across operational tables.
Secrets	Credentials are held in managed secret storage, never in source control or client bundles.

Compliance questions

We state only what we can evidence. Specific regulatory questions — how participant medical information should be classified for your jurisdiction and programme, data residency, retention obligations, consent handling for minors, and what contractual assurances are available — are answered directly during technical review rather than asserted in a sales document.

Data handling, backup and retention

Where data lives	Managed PostgreSQL in the cloud, plus a working copy on each field device. Your program has its own database rather than a shared table of everyone's records, and the hosting region for your deployment is confirmed in writing before onboarding.
On-device data	Limited to the working set the device needs, and cleared on sign-out. Devices should use screen lock and full-disk encryption as a matter of policy.
Backups	Automated managed database backups, plus the application's own scheduled backup of generated reports to cloud storage and Google Drive, with retention pruning and failure notification. Backup runs are recorded and reviewable.
Recovery	Deleted records go to a recycle bin rather than disappearing, and administrators have tooling to review and restore them. Recovery objectives for your deployment are agreed during onboarding.
Retention	Safety records are retained for the life of the account by default, since inspection, rope and incident history commonly needs to be produced years later. Custom retention on request.
Deletion	Account deletion removes operational data on request. Records under legal or insurance hold are handled case by case.
Export / portability	Reports export as PDF or HTML; underlying records export in a structured format. Customers can leave with their data.
Ownership	The customer owns their data, and this is reflected in the service agreement.

Reporting and export

- **Formats.** PDF for filing and distribution; HTML for quick sharing and viewing on any device; CSV for participation hours. Reports are generated server-side so output is consistent regardless of device.
- **Per record type.** Inspections, daily assessments, training sessions, group sessions, medical forms and reflections each produce their own report.
- **Delivery.** Download, or share directly by email from within the system, with delivery tracked and bounced or unsubscribed addresses handled.
- **Rope evidence.** A rope's accrued loads, use history and retirement record can be produced for a review, with voided corrections visible rather than hidden.
- **Audit packs.** A date range can be exported as a bundle covering assessments, inspections, rope status and training currency for a review.
- **Archive.** Completed reports are archived and retrievable, with their backup state visible so it is clear what has been stored off-site.
- **Filtering.** Reports scope by site, element, equipment item, rope, staff member, group or date range.

Integrations and API posture

Today	The system is self-contained. Email delivery of reports and notifications is built in, as is scheduled backup to Google Drive.
Inbound webhooks	Public endpoints exist for verified external callers and validate the caller's signature before processing any payload.
Planned	Registration and CRM imports for participant groups, calendar export for scheduled assessments, and a read API for organisations that want records in their own warehouse.
Not supported	Direct database access by third parties. All access goes through authenticated, policy-enforced interfaces.

Implementation status

This section is deliberately explicit: a technical buyer who discovers a gap themselves will discount everything else in the document. Everything marked Live is running software in daily production use on a working challenge course — not a specification and not a prototype.

Area	Status	Detail
Course elements & operating systems	Live	Element registry with rope-using flags, operating systems documented and referenced throughout.
Pre-use / daily assessments	Live	Beginning and end of day, operating systems, structures, equipment and environment checks, with photos.
Periodic inspections	Live	Systems, zip lines, equipment, standards, photos and written summary, with PDF and HTML output.
Rope log & wear tracking	Live	Rope register with locations; loads accrue from sessions and are derived from history, never a stored counter.
Rope retirement	Live	Reason-coded retirement with author and timestamp, reversible return to service, permanent history.
In-service training records	Live	Delivery approaches, systems covered, verifiable items, attendees and summary, with report generation and email.
Groups, sessions & people	Live	Group records with people, staff and elements used; headcounts drive rope use accrual.
Medical forms	Live	Medical forms with per-person entries and profiles, restricted by role and available offline.
Incident reporting	Live	Incidents captured against the session, element and people involved.
Facilitator reflections	Live	Structured post-session reflections with report output.
Offline sync layer	Live	Local-first writes, stable IDs, idempotent upserts, staleness-checked writes and recorded conflicts.
Participation hours	Live	Per-person hours across a date range with roles and record counts, exported as CSV.
Reporting	Live	Server-side PDF and HTML generation per record type, with email delivery.
Roles & row-level security	Live	Dedicated roles table, server-side role checks and RLS policies across operational tables.
Backup & recovery	Live	Scheduled report backup to cloud storage and Google Drive with pruning, recycle bin and admin recovery tooling.
Marketing site	Live	Public site with product positioning, SEO metadata, sitemap and search-console verification.
Enquiry capture	Live	Validated contact form writing to the production database with server-side schema validation.
Deployment & tenancy	Live	Each program runs in its own deployment with its own database — no shared tenancy with other organisations.
Registration / CRM integrations	Planned	Participant imports, calendar export and a read API are specified and not yet built.

NEXT STEPS

Where to go from here

The operating platform is proven in the field — it runs a working challenge course every day, and your program gets it as a deployment of your own. Coming in early still counts for something: the inspection templates, reporting formats and integrations built next are shaped by the first programs to adopt it.

See it on your course	A walkthrough against your own elements, checklists and rope register rather than a generic demo. Bring your current inspection forms and we will show you what they look like in the app.
Technical review	Part 2 is written to be handed to an IT or operations reviewer. We answer security, data-handling and compliance questions directly, and can demonstrate the offline and sync behaviour described in section 2.2.
Pilot on one course	Run a full cycle in parallel with your existing paper for a short period, so the record is never at risk while your team gets comfortable.
Commercial terms	Pricing, contract options and support terms depend on the size of your program and whether you want the hosted service or a dedicated deployment. They are quoted directly rather than stated in this document.

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On the web	topropesolutionz.com
This document	Sales & Technical Overview, version 2.0