Skyfire Scheduling Module

Comprehensive Feature Overview & Roadmap

Executive Summary

This document outlines a complete scheduling module for Skyfire that consolidates best-in-class features from field service management platforms (ServiceTitan, Jobber, Zuper), appointment scheduling tools (Calendly, Cal.com), and solar-specific solutions (SolarAPP+, SurgePV, Sunbase). The goal is to create a unified, intuitive, and powerful scheduling system that serves all stakeholders in the solar installation lifecycle.

Part 1: Core Foundation Features

1.1 Calendar & Schedule Views

Feature	Description
Multi-View Calendar	Day, Week, Month, Timeline (Gantt-style), and List views
Drag-and-Drop Scheduling	Intuitive drag-and-drop for creating, moving, and resizing events
Color-Coded Events	Visual distinction by event type (site survey, inspection, install, follow-up)
Resource Calendars	Individual calendars per team member, crew, or resource
Capacity Planning View	Visual representation of team capacity vs. scheduled workload
Calendar Overlay	Stack multiple calendars to see combined availability
Mini-Map Preview	Hover-preview showing event details without opening

1.2 Event/Appointment Types

Create distinct event types for solar-specific workflows:

- **Site Survey -** Initial property assessment
- **Design Review -** Customer presentation of system design
- **Permit Submission -** Deadline tracking for permit applications
- **Permit Inspection -** AHJ building/electrical inspections
- **Utility Inspection -** Utility company interconnection inspection
- **Installation -** Multi-day installation scheduling
- **Quality Check -** Internal QC verification
- **Customer Follow-Up -** Post-install check-ins
- **Service/Maintenance -** Ongoing maintenance appointments
- **Sales Consultation -** Initial sales meetings
- **HOA Meeting -** HOA approval meetings
- **Roof Assessment -** Structural evaluation appointments
- **Electrical Assessment -** Panel upgrade evaluations

1.3 Basic Scheduling Features

- **Quick Event Creation -** Single-click to create events
- **Event Templates -** Pre-configured templates for common appointment types
- **Duration Presets -** Standard durations (30min, 1hr, 2hr, half-day, full-day)
- **Buffer Times -** Automatic gaps between appointments
- **Minimum Notice -** Required lead time for bookings
- **Maximum Advance Booking -** Limit how far ahead appointments can be scheduled
- **Availability Windows -** Define working hours per team member
- **Blackout Dates -** Block holidays, vacation, unavailable periods
- **Recurring Events -** Daily, weekly, monthly, custom recurrence patterns

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Part 2: Advanced Scheduling Features

2.1 Intelligent Assignment & Dispatch

Feature	Description
Skill-Based Routing	Match technicians to jobs based on certifications (NABCEP, electrical license, etc.)
Territory Management	Assign service areas/zip codes to specific teams
Load Balancing	Distribute work evenly across available resources
Round-Robin Assignment	Rotate assignments among qualified team members
Priority Queuing	Urgent jobs automatically elevated and assigned first
Crew Scheduling	Assign multi-person crews to installations
Equipment Matching	Ensure technicians have required tools/vehicles

2.2 Time Window Management

- **Customer Time Preferences -** Morning, afternoon, evening preferences
- **Arrival Windows -** 2-hour or 4-hour windows (9am-11am, 1pm-5pm)
- **Appointment Slots -** Pre-defined bookable time slots
- **Overbooking Controls -** Prevent or allow controlled overbooking
- **Same-Day Scheduling -** Enable/disable same-day appointments
- **Time Zone Intelligence -** Automatic time zone handling for remote teams

2.3 Dependencies & Sequencing

```
Project Timeline Example:
─────────────────────────────────────────────────
Site Survey → Design Complete → Permit Submit → Permit Approved →
Installation → City Inspection → Utility Inspection → PTO
─────────────────────────────────────────────────
```

- **Task Dependencies -** "Cannot schedule inspection until installation complete"
- **Milestone Triggers -** Automatically unlock next phase when milestone achieved
- **Sequential Scheduling -** Enforce proper ordering of project phases
- **Gap Requirements -** "Schedule inspection 48hrs after install completion"
- **Parallel Tasks -** Identify tasks that can happen simultaneously

2.4 Conflict Detection & Resolution

- **Double-Booking Prevention -** Alert when resource already scheduled
- **Travel Time Conflicts -** Detect insufficient time between appointments
- **Certification Expiration Alerts -** Flag if assigned tech's cert expires before job
- **Equipment Conflicts -** Alert when same equipment assigned to overlapping jobs
- **Suggested Alternatives -** Auto-suggest next available slots when conflicts found

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Part 3: Solar Industry-Specific Features

3.1 Permit & Inspection Coordination

Feature	Description
AHJ Database Integration	Store permit requirements, fees, and contacts per jurisdiction
Permit Status Tracking	Visual pipeline: Submitted → Under Review → Approved → Expired
Inspection Scheduling	Direct integration with AHJ inspection scheduling systems
Utility Coordination	Track interconnection application status
PTO Tracking	Permission to Operate milestone and deadline tracking
Document Deadline Alerts	Reminders for permit expirations, required submittals
SolarAPP+ Integration	Connect to automated permit processing where available

3.2 Weather-Integrated Scheduling

This is a major differentiator for solar-specific scheduling:

```
Weather Integration Features:
├── 10-Day Forecast Display on Calendar
├── Rain/Snow Probability Warnings
├── Wind Speed Alerts (dangerous for roof work)
├── Temperature Extremes (too hot/cold for work)
├── UV Index (relevant for panel testing)
├── Auto-Reschedule Suggestions
└── Historical Weather Patterns for Planning
```

- **Forecast Overlay -** Show weather icons on calendar days
- **Weather-Based Alerts -** "Rain expected during scheduled installation"
- **Automatic Reschedule Suggestions -** AI suggests alternative dates based on weather
- **Weather Hold Status -** Mark appointments as "weather dependent"
- **Optimal Day Recommendations -** Suggest best days for outdoor work in next 2 weeks

3.3 Multi-Phase Project Scheduling

Solar installations are multi-phase projects requiring coordinated scheduling:

Phase Templates:

1. **Sales Phase -** Consultation, proposal, contract signing
2. **Pre-Construction -** Site survey, design, engineering, permit application
3. **Permitting -** Submission, review, approval, inspection scheduling
4. **Installation -** Material delivery, installation days, punch list
5. **Commissioning -** System testing, city inspection, utility inspection
6. **Activation -** PTO, system monitoring setup, customer training

- **Phase Progress Visualization -** Kanban-style or timeline view of project phases
- **Phase Duration Estimates -** Average time per phase based on historical data
- **Bottleneck Identification -** Highlight phases taking longer than average
- **Critical Path Display -** Show which tasks affect overall timeline

3.4 Utility & Grid Coordination

- **Utility Contact Database -** Store contacts and requirements per utility
- **Net Metering Deadlines -** Track NEM cutoff dates and rate changes
- **Interconnection Requirements -** Checklist per utility
- **Utility Inspection Scheduling -** Coordinate with utility schedules
- **Meter Installation Tracking -** Track meter exchange/installation appointments

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Part 4: Customer & Stakeholder Features

4.1 Customer Self-Service Portal

Inspired by Calendly, Cal.com, and Microsoft Dynamics Field Service:

Feature	Description
Self-Scheduling	Customers book appointments from available slots
Rescheduling	Customers can move appointments within parameters
Cancellation	Self-service cancellation with reason capture
Preference Setting	Morning/afternoon preferences, communication preferences
Document Upload	Customers upload utility bills, photos, documents
Progress Tracking	Visual timeline of their project status
Technician Tracking	"Track My Technician" - real-time location on install day

Embeddable Booking Widget:

```javascript
// Example: Embed on company website
<div id="skyfire-booking"
    data-company="solar-company-xyz"
    data-service="site-survey">
</div>
```

4.2 Automated Communications

Notification Types:

- **Appointment Confirmation -** Immediate confirmation with calendar invite
- **Reminder Sequence -** 1 week, 1 day, 1 hour before
- **Technician En Route -** "Your technician is on the way" with ETA
- **Arrival Notification -** "We've arrived at your property"
- **Completion Summary -** Summary of work completed with photos
- **Follow-Up Request -** Satisfaction survey, review request
- **Milestone Updates -** "Your permit has been approved!"

Communication Channels:

- Email (with calendar .ics attachments)
- SMS/Text
- In-App Push Notifications
- Automated Phone Calls (for critical alerts)
- WhatsApp (international)

4.3 Stakeholder Views

Different interfaces for different users:

Role	View Features
Office Admin	Full calendar, all resources, dispatch board
Field Technician	Personal schedule, navigation, job details, forms
Sales Rep	Leads/opportunities, consultation scheduling
Project Manager	Project timelines, phase tracking, resource allocation
Customer	Their project timeline, upcoming appointments
Subcontractor	Assigned jobs, availability submission

Part 5: AI & Automation Features

5.1 Intelligent Scheduling Engine

```
AI Optimization Factors:
├── Technician location (minimize drive time)
├── Skill requirements match
├── Equipment/vehicle requirements
├── Traffic patterns (historical + real-time)
├── Customer preferences
├── Job priority/urgency
├── Weather conditions
├── Permit/inspection deadlines
├── Team workload balance
└── Historical job duration data
```

AI-Powered Features:

- **Smart Suggestions -** "Based on your team's location, assign John to this job"
- **Route Optimization -** Optimal daily route for multi-stop days
- **Duration Estimation -** ML-based job duration predictions
- **Capacity Forecasting -** Predict future workload based on pipeline
- **Anomaly Detection -** Flag unusually long jobs or frequent reschedules
- **Optimal Scheduling Windows -** Learn which time slots have lowest no-show rates

5.2 Automated Workflows

Trigger-Based Automation Examples:

```yaml
# Example: Auto-schedule inspection after installation
trigger: "Installation Status = Complete"
actions:
  - wait: 24 hours
  - create_event:
      type: "City Inspection"
      assign: "Inspection Coordinator"
      due_within: 5 business days
  - notify:
      to: customer
      template: "inspection_scheduling"
```

Pre-Built Workflow Templates:

1. **New Project Kickoff -** Auto-create all milestone appointments
2. **Permit Approved -** Schedule installation, notify customer
3. **Installation Complete -** Schedule inspections, send completion docs
4. **Inspection Failed -** Create remediation task, reschedule inspection
5. **Weather Delay -** Notify all affected parties, suggest reschedule

5.3 Predictive Analytics

- **No-Show Prediction -** Flag high-risk appointments for confirmation
- **Delay Prediction -** Identify projects likely to miss deadlines
- **Resource Demand Forecasting -** Predict busy periods for hiring/planning
- **Seasonal Patterns -** Historical trends by month/quarter
- **Revenue Forecasting -** Project revenue based on scheduled installs

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Part 6: "WOW" Factor Features

6.1 Voice-Activated Scheduling

Inspired by Cal.com's Cal.ai Voice Scheduling:

```
"Hey Skyfire, schedule a site survey for
the Johnson project next Tuesday afternoon"

→ Creates event, assigns available surveyor,
  sends confirmation to customer
```

- **Natural Language Processing -** Understand conversational requests
- **Voice Commands in Mobile App -** Hands-free scheduling for field techs
- **Phone-Based Booking -** Customers call and AI schedules appointment
- **Voice Notes on Events -** Record notes that auto-transcribe

6.2 Augmented Reality Scheduling

AR Features for Field Teams:

- **AR Job Preview -** View scheduled work scope overlaid on property
- **AR Navigation -** Turn-by-turn directions with AR overlay
- **AR Time Estimates -** See real-time traffic/ETA while driving
- **AR Checklist -** Interactive checklist overlaid on job site

6.3 Smart Home Integration

- **Nest/Ecobee Integration -** Auto-adjust thermostat for install days
- **Smart Lock Integration -** Generate temporary access codes for inspectors
- **Smart Doorbell -** "Technician arrival" notifications via Ring/Nest
- **Garage Door -** Remote access for equipment storage

6.4 Blockchain-Verified Scheduling

For high-value commercial projects:

- **Immutable Audit Trail -** Blockchain record of all schedule changes
- **Smart Contracts -** Automatic payment triggers on milestone completion
- **Verified Timestamps -** Proof of inspection dates for warranty claims
- **Multi-Party Signatures -** Digital sign-off from all stakeholders

6.5 Digital Twin Integration

Connect scheduling to Skyfire's technical systems:

- **3D Model Viewer -** View AutoCAD designs from schedule event
- **Equipment Specs -** See exact equipment scheduled for installation
- **Change Order Impact -** Visualize how schedule changes affect design
- **As-Built Updates -** Field photos automatically linked to schedule events

6.6 Gamification & Performance

Team Performance Features:

- **Leaderboards -** Top performers by jobs completed, customer ratings
- **Achievement Badges -** "100 Installs", "Zero Reschedules This Month"
- **Streak Tracking -** "15 consecutive on-time arrivals"
- **Team Challenges -** "Complete 50 installs this month for bonus"
- **Performance Dashboards -** Personal and team metrics

6.7 Carbon Footprint Tracking

Unique for solar/sustainability-focused companies:

- **Miles Driven Per Job -** Track and optimize travel
- **Fuel Savings Calculator -** Show efficiency improvements
- **Carbon Offset Display -** "Your route optimization saved 50kg CO2 this month"
- **Sustainability Reports -** Export for ESG reporting

Part 7: Integration Ecosystem

7.1 Calendar Integrations

- Google Calendar (2-way sync)
- Microsoft Outlook/365 (2-way sync)
- Apple iCloud Calendar
- CalDAV (open standard)

7.2 Communication Integrations

- Twilio (SMS/Voice)
- SendGrid (Email)
- Slack
- Microsoft Teams
- WhatsApp Business

7.3 Solar Industry Integrations

- **Aurora Solar -** Design sync, auto-schedule design review
- **SolarAPP+ -** Automated permit processing
- **Enphase Enlighten -** System monitoring alerts
- **SolarEdge -** Monitoring integration
- **Tesla Powerwall -** Battery system scheduling

7.4 Business Tool Integrations

- QuickBooks/Xero (Financial)
- Salesforce/HubSpot (CRM)
- Zapier (1000s of apps)
- DocuSign (Contract signing)

7.5 Mapping & Navigation

- Google Maps Platform
- Mapbox
- HERE Technologies
- Apple Maps

Part 8: Mobile Experience

8.1 Field Technician App Features

Feature	Description
Today's Schedule	At-a-glance view of day's appointments
Turn-by-Turn Navigation	One-tap navigation to job site
Job Details	Full project info, customer contacts, history
Photo Capture	Before/during/after photos attached to events
Digital Forms	Checklists, inspection forms, sign-off
Time Tracking	Clock in/out per job
Offline Mode	Full functionality without connectivity
Parts Checklist	Verify equipment before leaving for job
Customer Signature	Digital signature capture
Expense Capture - Photo receipts, mileage logging	

8.2 Offline Capabilities

Critical for field work in areas with poor connectivity:

- Full schedule access offline
- Create/edit events offline (sync when connected)
- Photo capture and storage offline
- Form completion offline
- GPS tracking cached for later upload
- Queue notifications for sending when online

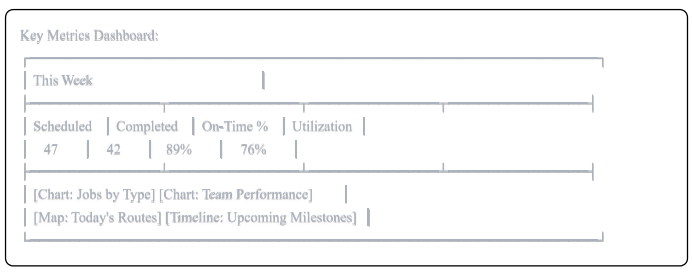
Part 9: Reporting & Analytics

9.1 Standard Reports

- **Daily/Weekly Schedule Summary -** Overview of scheduled vs. completed
- **Utilization Report -** Resource utilization percentages
- **On-Time Performance -** Arrival time accuracy
- **Job Duration Analysis -** Actual vs. estimated times
- **Reschedule/Cancellation Report -** Reasons and trends

- **Customer Satisfaction -** Post-appointment survey results
- **Revenue by Technician -** Jobs completed and value

9.2 Advanced Analytics Dashboards



9.3 Custom Report Builder

- Drag-and-drop report creation
- Schedule automated report delivery
- Export to PDF, Excel, CSV
- Share reports with stakeholders

Part 10: Implementation Roadmap

Phase 1: Core Foundation (Months 1-2)

- [ ] Calendar views (Day, Week, Month)
- [ ] Basic event CRUD operations
- [ ] Event types for solar workflows
- [ ] User/resource management
- [ ] Basic notifications (email)

Phase 2: Advanced Scheduling (Months 3-4)

- [ ] Drag-and-drop scheduling
- [ ] Skill-based assignment
- [ ] Conflict detection
- [ ] Recurring events
- [ ] Buffer times and availability

Phase 3: Customer Experience (Months 5-6)

- [ ] Customer portal
- [ ] Self-scheduling widget
- [ ] SMS notifications
- [ ] Technician tracking
- [ ] Mobile app (field technician)

Phase 4: Intelligence Layer (Months 7-8)

- [ ] Route optimization
- [ ] Weather integration
- [ ] AI scheduling suggestions
- [ ] Predictive analytics
- [ ] Automated workflows

Phase 5: Wow Features (Months 9-12)

- [ ] Voice scheduling
- [ ] Advanced integrations
- [ ] Gamification
- [ ] AR features
- [ ] Digital twin connection

Competitive Analysis Summary

Platform	Strengths to Adopt	Gaps to Fill
ServiceTitan	Robust dispatch board, customer history, mobile app	Complex, expensive, not solar-specific
Jobber	Simple interface, good for small teams	Limited solar workflows
Calendly	Beautiful UX, self-booking, integrations	No field service features
Cal.com	Open, customizable, unlimited events	Missing industry-specific features
Zuper	Field service focus, inventory integration	Generic, not solar-focused
Sunbase	Solar-specific, end-to-end	Less sophisticated scheduling
SurgePV	Permit tracking, solar workflows	Limited scheduling features

Skyfire's Opportunity: Combine the intuitive UX of Calendly with the robust field service capabilities of ServiceTitan, while adding solar-specific intelligence (weather, permits, utility coordination, equipment) that no competitor currently offers.

Conclusion

This scheduling module positions Skyfire as the most comprehensive solar project management platform by:

1. **Consolidating fragmented tools -** One system for all scheduling needs
2. **Solar-specific intelligence -** Weather, permits, utility coordination built-in
3. **Stakeholder inclusivity -** Everyone from customer to installer to inspector
4. **AI-powered efficiency -** Smart suggestions, optimization, predictions
5. **Delightful experience -** Modern, intuitive, mobile-first design

The phased approach allows for incremental delivery while building toward the full vision of an intelligent, automated scheduling ecosystem that makes solar installation projects faster, more predictable, and more profitable.

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