

MODULE 1 - FREE COURSE

Patent Fundamentals

Master the essential concepts, structures, and processes that form the foundation of patent protection and strategy

Your Instructor: A Patent Professional with 25+ Years of Prosecution Experience

Offered by: Waveform Holdings LLC

Lesson 1.1: What Is a Patent?

A patent is a government-granted monopoly on an invention—a legal right that excludes others from making, using, or selling your invention for a limited time. But what exactly does this right protect, and what obligations come with it? In this foundational lesson, you'll learn what a patent really is, what it protects, and the fundamental bargain at the heart of every patent system: you disclose your invention publicly, and the government grants you exclusive rights for a limited period.

What a Patent Is: A Legal Monopoly

At its core, a patent is a legal document issued by a government agency (like the U.S. Patent and Trademark Office) that grants you the exclusive right to practice an invention for a limited time. Think of a patent like a property deed for an idea—it establishes your ownership and prevents others from using that property without your permission.

The patent grants you the right to **exclude others** from:

- **Making** the invention (manufacturing or producing it)
- **Using** the invention (operating, practicing, or employing it)
- **Selling** the invention (offering it for sale or selling it)
- **Importing** the invention (bringing it into a country)
- **Offering to sell** the invention

Crucially, a patent does NOT grant you the right to make and sell your invention. Instead, it gives you the right to **stop others** from doing these things. For example, if you hold a patent on a new battery chemistry, you don't automatically have the right to manufacture it—you still need regulatory approval, manufacturing capability, and capital. But the patent ensures no competitor can legally copy your chemistry without your permission.

The Patent Bargain: Disclosure in Exchange for Exclusivity

Patents exist because society struck a historical bargain with inventors. Here's the deal:

- **You disclose:** You fully describe your invention in a published patent document, allowing others to learn from it.
- **Society grants exclusivity:** In return, the government gives you exclusive rights for a limited time (typically 20 years from filing).

This bargain incentivizes innovation. Without patents, inventors would keep inventions secret as trade secrets forever, slowing technological progress. With patents, inventors are motivated to innovate and publish their innovations because they receive a temporary monopoly.

The flip side: after the patent expires, your invention enters the public domain. Anyone can make and sell it. This encourages the next generation of inventors to build on your work.

EXAMPLE: PATENT AS TEMPORARY MONOPOLY

Imagine you invent a novel RF amplifier circuit in 2024. You file a utility patent on January 1, 2024. The patent is granted in 2027. It expires in 2044 (20 years after filing). From 2027 to 2044, you have exclusive rights—competitors cannot legally sell an amplifier using your claimed circuit. On January 1, 2045, anyone can use your circuit. The temporary monopoly encourages you to innovate and publish; the eventual public domain encourages the next generation of RF engineers to improve on your design.

What Patents Protect vs. What They Don't

Patents protect **technical inventions**—novel, non-obvious methods, machines, compositions of matter, and processes that are useful. They do NOT protect abstract ideas, laws of nature, or business methods standing alone.

What Patents Protect	What Patents Don't Protect
Machines & devices: A new type of mechanical compressor, an RFID tag circuit, a prosthetic limb design	Abstract ideas: "A method for optimizing traffic flow" without technical implementation details
Processes & methods: A new chemical synthesis technique, a manufacturing process, a software algorithm	Laws of nature: The law of gravity, $E=mc^2$, gene sequences in their natural state
Compositions of matter: A new alloy, a drug molecule, a polymer formulation	Pure business methods: A marketing strategy, a sales technique (without technical innovation)
Software & algorithms (with limits): A novel machine-learning algorithm applied to a specific technical problem	Artistic or literary works: Poems, songs, novels (these use copyright, not patents)
Product designs (in some patent types): A distinctive shape, ornamental design of a widget	Brand names and logos: These are protected by trademarks, not patents

What Rights Does a Patent Grant You?

A patent grants you three fundamental rights:

Right	What It Means
Right to Exclude	You can stop competitors from making, using, selling, importing, or offering to sell your patented invention. This is enforceable in federal court through patent infringement litigation.
Right to License	You can allow others to use your patent in exchange for royalties or licensing fees. This is how many companies generate revenue from patents without manufacturing themselves.
Right to Assign	You can sell your patent outright to another party. This transfers ownership entirely. Companies frequently buy and sell patents as assets.

Patents vs. Trade Secrets: A Critical Choice

Patent protection is not the only way to protect an invention. Some inventions are better protected as trade secrets. Understanding when to patent and when to keep something secret is a crucial strategic decision.

PATENTS VS. TRADE SECRETS ILLUSTRATED

Patent approach: You invent a new RF amplifier circuit. You file a patent application, which is published 18 months later. Your patent is granted in 2027. You have exclusive rights until 2044, then it expires and anyone can use it. During those 17 years, competitors can read your patent document, understand your circuit, and design around it. But they cannot legally make an identical circuit.

Trade secret approach: You keep the circuit design confidential, never file a patent. You manufacture amplifiers and never disclose the design. As long as you keep it secret, no one can legally use it. If a competitor independently discovers the same circuit, they can use it (because independent discovery is not a violation of trade secret law). But if they obtain it through theft or breach of confidentiality, you can sue.

Which is better? Patents are stronger if your invention can be reverse-engineered (someone can buy your product and figure out how it works). Trade secrets are better if the invention is not visible in the final product or is difficult to reverse-engineer. For RF circuits, patents are often better because competitors can analyze your product and eventually design around the patent. But if the circuit is embedded in software that's not easily disassembled, trade secret protection might be stronger.

Duration of Patent Rights & Maintenance Fees

A U.S. utility patent lasts for **20 years from the date of filing** (not from the date the patent is granted, which is usually 2-4 years later). However, maintaining a patent is not automatic—you must pay maintenance fees to keep the patent in force.

- **First maintenance fee:** Due 3.5 years after grant (required to keep the patent alive)
- **Second maintenance fee:** Due 7.5 years after grant
- **Third maintenance fee:** Due 11.5 years after grant

If you fail to pay a maintenance fee on time, the patent expires and cannot be revived (except in rare circumstances). This is an important distinction—a patent is not free forever. Many patents expire not because their term has run out, but because the owner chose not to pay maintenance fees (often because the patent is no longer valuable).

PRACTICAL EXERCISE 1.1: PATENT VS. TRADE SECRET ANALYSIS

Select two real products from your field of interest (or general knowledge). For each, decide: should this invention be protected as a patent or a trade secret? Write a one-page memo for each product explaining your reasoning. Consider: (1) Can it be reverse-engineered? (2) How long will it take competitors to independently discover the same solution? (3) What is the competitive lifespan (how long until the product becomes obsolete)? (4) What does the company actually do (patent or secret)?

Deliverable: Two one-page analyses comparing patent vs. trade secret protection for two products.

Lesson 1.2: Types of Intellectual Property

Intellectual property is not monolithic. Patents, trademarks, copyrights, trade secrets, and other legal protections serve different purposes and protect different types of creative works and inventions. In this lesson, you'll learn how each form of IP protection works, when to use each one, and how they can overlap. A single product may be protected by multiple types of IP simultaneously—a smartphone, for example, is protected by utility patents (its technology), design patents (its appearance), trademarks (the brand name), and copyrights (the software). Understanding the full IP toolkit helps you build stronger, more comprehensive protection.

The Four Main Types of Intellectual Property

In most jurisdictions, intellectual property is divided into four main categories. Each protects a different type of creative work or invention:

Type	What It Protects	Duration	How You Get It
Patents	Inventions: machines, processes, compositions of matter, new technical solutions	20 years from filing (utility); 15 years from grant (design)	File an application with the patent office; examination required
Trademarks	Brand identity: names, logos, slogans, symbols that identify a source of goods/services	Indefinite, as long as you use and renew it	File an application OR use it in commerce (common law trademark)
Copyrights	Original creative works: writing, music, art, software code, films, photographs	Life of author plus 70 years (works for hire: 95-120 years)	Automatic upon creation (in most countries); registration recommended
Trade Secrets	Confidential business information: formulas, processes, methods, customer lists that provide competitive advantage	Indefinite, as long as it remains secret	Maintain confidentiality; no registration required

Patents: Protecting Technical Inventions

Patents protect technical innovations—inventions that solve problems using novel approaches. There are three types of patents in the U.S. system:

- **Utility patents:** Cover the function and operation of an invention (how it works). This is the most common type. Examples: a new battery chemistry, an RF circuit design, a software algorithm applied to a specific technical problem.

- **Design patents:** Cover the ornamental appearance of an invention (how it looks). Examples: the distinctive shape of a smartphone, the design of a car body, the visual layout of a user interface.
- **Plant patents:** Cover new plant varieties. Less common for most engineers and entrepreneurs, but important in agriculture and biotechnology.

Patents require examination by a government office (USPTO in the U.S.). An examiner reviews your application to verify the invention is truly novel and non-obvious. This examination process typically takes 2-4 years.

Trademarks: Protecting Brand Identity

A trademark is a word, phrase, symbol, design, or combination that identifies the source of a product or service. Trademarks protect your brand and prevent competitors from causing consumer confusion.

Examples of trademarks:

- **Word marks:** "Apple," "Microsoft," "Tesla"
- **Logos:** The Apple logo, the Nike Swoosh, the McDonald's Golden Arches
- **Slogans:** "Just Do It," "Think Different," "The Future Is Electric"
- **Non-traditional marks:** A distinctive sound (the Intel chime), a color (Tiffany's blue), a shape (the Coca-Cola bottle)

Trademarks differ from patents in a crucial way: they don't expire as long as you use them and renew them. A brand name can be protected indefinitely. This makes trademarks invaluable for building long-term brand equity.

TRADEMARK PROTECTION EXAMPLE

You develop a new type of battery and decide to call it "PowerCore." You file a trademark application to protect the name "PowerCore" in the battery category. Once registered, no competitor can use "PowerCore" or a confusingly similar name for batteries. If a competitor tries to use "PowerKore" (a similar sound), you can sue for trademark infringement. As long as you continue using "PowerCore" and renewing the trademark, it remains your property forever—even after any patent on the battery chemistry expires.

Copyrights: Protecting Original Creative Works

Copyright protects original works of authorship—creative expressions, not functional inventions. In the engineering and tech world, copyrights protect:

- **Software code:** The source code you write is protected by copyright immediately upon creation
- **Technical documentation:** User manuals, design documents, installation guides
- **Audiovisual content:** Videos, instructional materials, product demos
- **Artistic designs:** Graphics, UI designs, artwork
- **Hardware documentation:** Schematics, circuit diagrams (the creative expression, not the functional invention)

Copyright is automatic—you don't need to register. As soon as you write code or create a document, it's copyrighted. However, registration with the U.S. Copyright Office provides additional legal benefits (the ability to sue for infringement).

Copyright protects the **expression**, not the underlying idea. If you write a sorting algorithm, copyright protects your specific code. A competitor can write their own sorting algorithm (different code) that does the same thing.

Trade Secrets: Protecting Confidential Information

A trade secret is information that derives economic value from not being publicly known and is subject to reasonable efforts to maintain secrecy. Trade secrets don't require registration—they require confidentiality.

Common examples of trade secrets:

- **Formula or recipe:** Coca-Cola's formula is perhaps history's most famous trade secret
- **Manufacturing process:** Proprietary steps to manufacture a product more efficiently or with higher quality
- **Business methods:** Pricing strategies, supplier relationships, customer lists
- **Technical know-how:** Optimization parameters, material specifications, assembly techniques

To protect a trade secret, you must take active steps to maintain confidentiality: non-disclosure agreements with employees, restricted access to facilities, secure data systems, limited distribution of sensitive documents.

Key advantage: Trade secrets last indefinitely as long as they remain confidential. **Key disadvantage:** If someone discovers the secret through independent research or reverse-engineering, you have no legal recourse. Also, if your secret leaks, you lose all protection.

How IP Types Overlap on a Single Product

Most products benefit from multiple types of IP protection working together. Here's a realistic example:

COMPREHENSIVE IP STRATEGY EXAMPLE: A SMART THERMOSTAT

Patents: Utility patents on the temperature-sensing algorithm, the wireless connectivity method, and the machine-learning occupancy detection. Design patent on the distinctive shape and appearance of the device.

Trademarks: The brand name (e.g., "SmartHeat"), the logo, the product name.

Copyrights: The mobile app software, the firmware code, the user manual and instructional videos, the UI design.

Trade Secrets: The exact machine-learning model parameters (not disclosed in the patent), the specific manufacturing tolerances that achieve superior performance, the supplier relationships and cost optimization strategies.

Result: The company has comprehensive protection. Patents prevent competitors from copying the technical innovation; trademarks prevent brand confusion; copyrights protect the software; trade secrets protect the operational details that give competitive advantage even if the patent expires.

STRATEGIC INSIGHT: PATENTING VS. KEEPING A SECRET

When you patent an invention, you disclose it publicly (and permanently). When you keep something a trade secret, you maintain confidentiality but lose protection if someone independently discovers it. Choose wisely: patent inventions that are visible in your product (because competitors will reverse-engineer them anyway); keep as trade secrets the know-how that competitors cannot easily discover.

PRACTICAL EXERCISE 1.2: BUILD AN IP PROTECTION STRATEGY

Select a product or technology you're familiar with. Create a comprehensive IP protection strategy covering patents, trademarks, copyrights, and trade secrets. For each IP type, identify what aspects of the product should be protected and explain your reasoning. Write a 2-3 page strategy document including: (1) What should be patented and why; (2) What brand elements need trademark protection; (3) What software/content needs copyright; (4) What should be kept as trade secrets and why.

Deliverable: A 2-3 page IP protection strategy document with specific recommendations.

Lesson 1.3: Patentability Requirements

Not every invention can be patented. Patent law sets specific requirements that an invention must meet to be eligible for protection. In this lesson, you'll learn the four core requirements for patentability under U.S. law and how patent examiners evaluate these requirements. You'll also learn about subject matter eligibility—the often-confusing legal standard that determines whether software, business methods, and AI inventions can be patented. Understanding these requirements before you invest time and money in a patent application can save you thousands of dollars and help you focus on inventions with genuine patentable potential.

The Four Core Patentability Requirements

Under U.S. patent law (Title 35 of the United States Code), an invention must satisfy four requirements to be patentable:

Requirement	Definition & Legal Basis
Novelty (35 USC 102)	The invention must be NEW —it cannot have been publicly disclosed, sold, patented, or described in a printed publication anywhere in the world before the inventor filed. Even the inventor's own prior disclosure counts against novelty (with limited grace periods in some countries).
Non-Obviousness (35 USC 103)	The invention must not be OBVIOUS to someone skilled in the relevant technical field, given prior art (existing patents and publications). It's not enough to be novel—it must represent a non-trivial advance.
Utility (35 USC 101)	The invention must have a USEFUL, CONCRETE APPLICATION . It must solve a practical problem or perform a real-world function. Abstract concepts or purely theoretical inventions don't qualify.
Enablement / Written Description (35 USC 112)	You must DESCRIBE the invention completely enough that someone skilled in your field could make and use it without undue experimentation. Your patent application must demonstrate you actually possess and understand the invention.

Novelty: Your Invention Must Be New

Novelty means your invention cannot exist in prior art. Prior art includes:

- **Previously issued patents:** Any patent granted anywhere in the world before your filing date
- **Printed publications:** Published papers, books, magazine articles, even blog posts (if publicly available)

- **Public use or sale:** If your invention was commercially available or used publicly before filing, it's not novel
- **Your own prior disclosures:** A speech, paper, product demonstration, or public prototype that you (the inventor) disclosed

Critical point: In the U.S., you have a **one-year grace period**. If you publicly disclose your invention, you can still file a patent application within one year of the disclosure. Many other countries do NOT have this grace period—a single public disclosure can destroy patentability.

NOVELTY EXAMPLE

You invent an RF amplifier circuit using a novel biasing technique. You publish a paper describing the circuit on January 15, 2024. Under U.S. law, you can file a patent application by January 15, 2025 (one year later) and still claim the priority date of the paper. But if you wait until January 16, 2025 to file, the patent is barred by your own prior publication. In most other countries, the paper publication immediately bars patentability—no grace period.

Non-Obviousness: Demonstrating a Non-Trivial Advance

Non-obviousness is the most subjective and litigated requirement. An invention can be novel (not explicitly disclosed before) but still obvious. Obviousness means a person skilled in your field would find the invention to be a routine, predictable combination of known elements.

How patent examiners assess obviousness:

- Would combining two known prior art references be an obvious next step?
- Does your invention use known techniques in predictable ways?
- Would there be a reasonable expectation of success?
- Is there evidence you solved a difficult, unexpected problem?

OBVIOUS VS. NON-OBVIOUS EXAMPLE

Obvious: A prior-art RF amplifier uses a fixed bias network. Someone suggests "use a temperature-compensated thermistor instead"—a straightforward, routine substitution using well-known components. An examiner would likely reject this as obvious.

Non-obvious: A prior-art RF amplifier suffers from ± 0.8 dB gain variation across temperature. You discover that combining a thermistor with a current mirror in a novel feedback configuration achieves ± 0.2 dB variation—unexpected improvement. You can demonstrate unexpected results with test data, proving the combination produced surprising benefits not predictable from prior art alone.

NON-OBVIOUSNESS TIP

The strongest evidence of non-obviousness is unexpected results. If your invention produces surprising performance benefits, test results, or solves a long-standing problem that experts thought was intractable, document it thoroughly. This evidence greatly strengthens your patent application against non-obviousness rejections.

Utility: Real-World, Practical Application

Utility requires your invention to have a real, practical application. It must solve an actual problem or perform a useful function. The standard is low—your invention doesn't need to be revolutionary, just **practically useful**.

Inventions that fail the utility requirement:

- **Perpetual motion machines:** Violate thermodynamic laws; cannot work in practice
- **Abstract theoretical concepts:** A new mathematical formula with no stated application

- **Cruel or offensive inventions:** Devices designed to harm or exploit (though this is rarely the basis of rejection)
- **Impossible structures:** A design that cannot be physically constructed with known materials and methods

Most practical inventions pass the utility requirement easily. If you can describe a real problem your invention solves, you likely meet this requirement.

Enablement & Written Description: Teaching Others How to Make It

Enablement requires you to describe your invention completely enough that someone skilled in your field could make and use it without undue experimentation. Written description requires you to demonstrate you actually possess and understand the invention.

What makes good enablement:

- Specific component values, dimensions, material properties (not vague descriptions)
- Step-by-step process descriptions with parameters
- Clear technical drawings with labeled reference numerals
- Examples and embodiments showing how to implement the invention
- Where experimentation is needed, explicit statements about what's routine and what's novel

Common enablement problems:

- Vague language ("optimize," "improve," "adjust as needed") without specifics
- Insufficient detail on critical steps in a process
- Claims broader than the disclosure (claiming protection for variations you didn't describe)

ENABLEMENT EXAMPLE

Poor enablement: "A temperature compensation circuit using a thermistor." Not enough detail—how is the thermistor connected? What resistance value? What temperature range?

Good enablement: "A negative-temperature-coefficient (NTC) thermistor (part number Vishay NTC50903F3950HF, 10 k Ω nominal resistance at 25°C) placed in thermal contact with the RF transistor die, connected in the bias network as shown in Figure 2. The thermistor's resistance varies from 1.2 k Ω at -40°C to 240 Ω at +60°C, maintaining constant bias current within $\pm 5\%$ over the specified temperature range."

Subject Matter Eligibility: The Alice/Mayo Framework for Software & Business Methods

Not all types of inventions are eligible for patenting under 35 USC 101. The Supreme Court rulings in **Alice Corp. v. CLS Bank** and **Mayo v. Prometheus** established that certain categories of inventions are not patentable: abstract ideas, laws of nature, and natural products.

Patent-ineligible categories:

- **Abstract ideas:** Fundamental economic practices, mathematical algorithms, or methods of organizing information
- **Laws of nature:** Natural phenomena, physical laws, genetic sequences in their natural state
- **Natural products:** Isolated DNA (though engineered DNA may be patentable)

This has caused significant uncertainty for software and business method patents. However, the framework provides a path: an invention may escape the abstract idea exception if it is tied to a **specific, concrete application** or a **tangible technological improvement**.

SUBJECT MATTER ELIGIBILITY: SOFTWARE PATENTS

Ineligible (abstract idea): "A method for optimizing traffic flow."

Standing alone, this is a business/organizational method without technical specificity.

Eligible (concrete application): "A method for controlling a traffic signal system comprising: (1) receiving real-time vehicle detection data from street-level sensors; (2) processing the sensor data through a machine-learning model trained on historical traffic patterns; (3) computing optimal signal timing parameters; (4) transmitting timing adjustments to traffic controllers at least 500 milliseconds before the next light cycle." This is tied to specific hardware (sensors, controllers), concrete technical problems (latency, accuracy), and measurable improvements.

SOFTWARE PATENT STRATEGY

If you're developing software inventions, tie your patent application to concrete technical problems and tangible hardware or systems. Avoid vague, abstract language. Use specific performance metrics, describe actual data formats, reference specific algorithms, and show how your software solves a real technical problem—not just a business or organizational challenge.

What Can't Be Patented: A Quick Reference

Beyond the core requirements, certain inventions are explicitly excluded from patenting:

- **Mere ideas or concepts:** An idea without embodiment or reduction to practice
- **Methods of doing business:** Pure business strategies without technical innovation
- **Products of nature:** Naturally occurring plants, animals, or minerals (though cultivated/genetically modified versions may be patentable)

- **Printed matter:** Pure printed documents without new technical structure
- **Immoral or offensive inventions:** Devices designed to harm or violate public policy (rarely invoked)

PRACTICAL EXERCISE 1.3: PATENTABILITY ASSESSMENT

Select three inventions from your field (real or hypothetical). For each, write a one-page assessment evaluating patentability against the four core requirements: (1) Novelty—has this been disclosed before? (2) Non-obviousness—would a skilled person find this routine or surprising? (3) Utility—does it solve a practical problem? (4) Enablement—is it described in sufficient detail? Conclude with a patentability opinion (likely patentable / uncertain / not patentable) and recommendations.

Deliverable: Three one-page patentability assessments with clear patentability opinions and reasoning.

Not sure whether to file? The **Patent Filing Decision Flowchart (\$9)** walks you through a visual decision tree with 7 key questions — covering patentability, prior art risk, commercial viability, and cost-benefit — so you can make a confident go/no-go decision before investing thousands.

Lesson 1.4: The Patent System

Patents don't just appear. They emerge from a complex system of rules, agencies, and processes. In this lesson, you'll learn how the patent system is structured, the different types of patents you can file, the distinction between provisional and non-provisional applications, and how the examination process works. You'll also learn about patent term—how long your patent lasts and when it expires. Understanding the system demystifies the patent process and helps you make strategic decisions about when and where to file.

The USPTO: Structure and Three Types of Patents

In the United States, the U.S. Patent and Trademark Office (USPTO) is responsible for issuing patents. The USPTO is part of the Department of Commerce and employs thousands of patent examiners who review applications.

The USPTO issues three types of patents:

Patent Type	What It Covers	Term
Utility Patent	Function and operation of an invention (how it works, what it does). Covers machines, processes, compositions of matter, methods. Most common type.	20 years from filing date
Design Patent	Ornamental appearance of an invention (how it looks). Covers distinctive shapes, visual designs, surface patterns. Does not cover function.	15 years from grant date (recent change; previously 14 years)
Plant Patent	New plant varieties that are asexually reproduced. Covers genetically distinct plants. Uncommon for most engineers.	20 years from filing date

Provisional vs. Non-Provisional Applications: Two Paths to Protection

When you file a patent application, you have two strategic options: provisional or non-provisional. Understanding the differences is crucial for timing and cost management.

Aspect	Provisional Application	Non-Provisional Application
Purpose	Establishes an early filing date (priority) at low cost; not examined	Formal application that undergoes examination and leads to issued patent
Examination	No examination; provisional applications are not reviewed for patentability	Full examination by a USPTO examiner; may be rejected and require amendments
Requirements	Description of invention; drawings optional; claims not required; less formal	Complete specification; drawings required; detailed claims; formal requirements (filing fees, cover sheet)
Cost	Low: filing fee \$325 (small entity \$130; micro-entity \$65); no examination costs	Higher: filing fee + search/examination fees + possible attorney fees. Total: typically \$2,000-\$5,000+
Duration	Lasts 12 months; expires if you don't file a non-provisional application	Can last 2-4+ years during examination; becomes a patent if approved
Patent Term	Does NOT count toward the 20-year term; term starts from the non-provisional filing date	Defines the 20-year patent term from this filing date

PROVISIONAL VS. NON-PROVISIONAL STRATEGY

Scenario: You invent an RF circuit on January 15, 2024. You're not ready to file a full non-provisional application because the design isn't finalized, and you haven't tested prototypes thoroughly.

Strategy: File a provisional application on January 15, 2024, describing your circuit design and the problem it solves. Cost: \$65 (micro-entity), \$130 (small entity), or \$325 (large entity)—micro-entity status requires filing a *certification of micro entity status* with the application. This gives you priority—anyone filing after you cannot claim an earlier priority date. You have 12 months to refine your design, conduct tests, and file a non-provisional application.

Timeline:

- Jan 15, 2024: File provisional (establishes priority date)
- Jan 2025: File non-provisional application (claiming priority to provisional)
- 2025-2027: Examination period
- Late 2027: Patent granted (example timing)
- Jan 15, 2045: Patent expires (20 years from non-provisional filing, not from provisional filing)

PROVISIONAL APPLICATION TRAP

Many inventors file a provisional application thinking they've secured patent protection for 12 months. In reality, you have NO patent rights from a provisional application—it's not examined, and it doesn't become a patent. If you don't file a non-provisional within 12 months, your provisional expires worthless. Provisional applications are useful for establishing an early filing date, but they're not patents. Plan to file a non-provisional within 12 months if you want actual patent protection.

The Patent Examination Process: From Filing to Grant

When you file a non-provisional patent application, it undergoes a multi-step examination process that typically takes 2-4 years. Here's what happens:

1. **Initial review (3-6 months after filing):** USPTO checks that your application is complete, fees are paid, and basic requirements are met.
2. **Examiner assignment (6-12 months after filing):** Your application is assigned to a patent examiner in the relevant technical field (e.g., RF engineering, software, mechanical design).
3. **First Office Action (12-18 months after filing):** The examiner conducts a thorough search for prior art and issues a written report. They may approve some or all claims, or reject claims for novelty, non-obviousness, or enablement issues.
4. **Applicant response (usually 3 months):** You (or your attorney) respond to rejections. You can amend claims, provide new evidence, or argue why the examiner's rejection is incorrect.
5. **Possible iterations (multiple rounds):** If your response doesn't fully address rejections, the examiner may issue a second Office Action, requiring another response. This cycle repeats until claims are approved or you abandon the application.
6. **Final approval and grant (2-4+ years total):** Once the examiner approves all claims, you pay the issue fee, and the patent is granted and published.

EXAMINATION TIMELINE EXAMPLE

Jan 2024: File non-provisional patent application on RF circuit

Jun 2024: Initial review complete; application deemed ready for examination

Nov 2024: Examiner assigned

Mar 2025: First Office Action issued; examiner rejects two of your three claims as "obvious in light of prior art references A and B"

Jun 2025: You file a response, amending claims and arguing with test data that results are unexpected

Oct 2025: Examiner approves amended claims but rejects one claim as still lacking enablement

Jan 2026: You file final response, providing additional technical detail

Apr 2026: Examiner approves all claims

Jun 2026: You pay issue fee (\$1,000+)

Aug 2026: Patent granted and published

Jan 2044: Patent expires (20 years from Jan 2024 filing date)

Patent Claims: Defining the Scope of Your Right to Exclude

A patent is not a single broad right to exclude. Instead, it consists of multiple **claims**, each defining a specific invention boundary. Claims are the legal definitions that determine what exactly you have the right to exclude others from making.

Think of claims as a fence around your invention. Everything inside the fence (covered by a claim) is protected. Everything outside is not. Competitors try to design products that "avoid" your claims—they stay outside the fence.

Types of claims:

- **Independent claims:** Standalone claims that completely describe an invention by themselves. These are broad.
- **Dependent claims:** Claims that narrow or add details to an independent claim. These are narrower but more specific.

A good patent strategy includes a mix: broad independent claims to capture variations, and narrow dependent claims with specific details that might withstand examiner rejection.

PATENT CLAIMS EXAMPLE (SIMPLIFIED)

Independent Claim 1 (broad): "A temperature-compensated RF amplifier bias circuit comprising a thermistor and a feedback network."

Dependent Claim 2 (narrows Claim 1): "The circuit of claim 1, wherein the thermistor is an NTC type with a nominal resistance of 10 kΩ at 25°C."

Dependent Claim 3 (further specifies): "The circuit of claim 1, wherein the thermistor is placed in thermal contact with the RF transistor die."

Independent Claim 4 (different approach, also broad): "A method for maintaining stable RF amplifier gain across temperature, comprising: measuring junction temperature; adjusting bias current based on measured temperature to within $\pm 5\%$ variation."

If Claim 1 is rejected as obvious, Claims 2-3 (narrower) might be approved because the specific details show non-obviousness. Claim 4 may capture the method even if the circuit claim fails.

Patent Term: 20 Years, But Complications

A U.S. utility patent lasts for **20 years from the filing date of the non-provisional application** (or from the priority date if you file a provisional first). Design patents last 15 years from grant. But the term is not absolute—several factors can extend or curtail it.

- **Patent Prosecution Highway (PPH):** Expedited examination can shorten prosecution time, meaning you get exclusive rights sooner.
- **Patent Term Adjustment (PTA):** If the USPTO causes delays in examination, you receive extra time added to your term.

- **Patent Term Extension (PTE):** For certain inventions (like pharmaceutical and biotechnology products) subject to regulatory approval, you can extend the term to compensate for FDA approval delays.
- **Maintenance fees:** If you fail to pay required maintenance fees, your patent expires early and cannot be revived.

THE 20-YEAR CLOCK STARTS NOW

Remember: the 20-year term starts from your filing date, not your grant date. If your non-provisional application takes 3 years to be examined and granted, you've already "spent" 3 years of your 20-year term. This is why filing early (via provisional application if needed) is strategically important. You're starting the clock sooner.

PRACTICAL EXERCISE 1.4: PATENT FILING STRATEGY TIMELINE

Develop a detailed patent filing and prosecution timeline for an invention of your choice. Include: (1) Decision on provisional vs. non-provisional; (2) Estimated filing dates; (3) Expected examination period and milestones; (4) Estimated grant date; (5) Patent expiration date; (6) Maintenance fee schedule. Also identify the patent types (utility, design, or both) you would pursue and explain why. Write a 1-2 page strategy document with a timeline diagram.

Deliverable: A patent filing and prosecution timeline with strategic recommendations.

Lesson 1.5: Timeline and Cost Overview

How long does it take to get a patent? How much does it cost? These are questions every inventor asks. The honest answer: it depends. Filing to grant typically takes 2-4 years in the U.S., and costs range from a few hundred dollars for a solo inventor using DIY resources to \$10,000+ with an experienced patent attorney. In this final foundational lesson, you'll learn realistic timelines, cost breakdowns, and strategies for managing both. You'll discover how solo inventors can afford patent protection through fee reductions, and when investing in an attorney is worth the cost.

Patent Timeline: From Idea to Issued Patent

The timeline from initial invention to an issued patent typically spans several years. Here's a realistic breakdown:

Phase	Timeline	Key Activities
Conception & Documentation	0-6 months	Document your idea in an inventor's notebook. Test initial concepts. Conduct preliminary prior art search.
Development & Prototyping	3-12 months (often overlaps with documentation)	Build working prototype or conduct detailed design. Test performance. Refine based on results.
Decision & Filing	1 month	Decide on provisional vs. non-provisional. Prepare and file application. This triggers the clock on patent term.
Examination (First Office Action)	6-18 months after filing	USPTO examines your application. Issues first Office Action (rejection or approval of claims).
Prosecution Rounds	1-3+ years	You respond to rejections, amend claims, provide arguments. Multiple back-and-forths with examiner.
Grant & Publication	2-4 years after filing (total)	Examiner approves all claims. You pay issue fee. Patent granted and published.

REALISTIC TIMELINE EXAMPLE (MODERATE COMPLEXITY)

Month 0: Conceive RF amplifier circuit; begin inventor's notebook

Months 1-6: Design and simulate circuit; document multiple variations; conduct prior art search

Months 6-12: Build prototype; test across temperature range; document results

Month 12: File non-provisional patent application

Month 18: USPTO issues first Office Action; two claims approved, one rejected as "obvious"

Month 21: You file response with amended claims and test data showing unexpected results

Month 25: Examiner approves all amended claims

Month 26: You pay issue fee

Month 28: Patent granted and published

Year 20 from Month 12: Patent expires

Total time from idea to patent: ~28 months. **Protected exclusive period:** ~19 years (from grant to expiration).

PATENT PENDENCY VARIES

Some patents grant in 18 months; others take 5+ years. Factors: technical complexity, number of claims, examiner's workload, and how many rejection rounds occur. Telecommunications and software patents often face longer prosecution than mechanical patents.

Cost Breakdown: Solo Inventors vs. Startup/Corporate Inventors

Patent costs vary dramatically based on complexity and whether you use an attorney. Here are realistic estimates for different scenarios:

Scenario	Components	Estimated Total Cost
Solo Inventor (DIY, No Attorney)	Most independent inventors qualify as micro-entities (80% USPTO fee reduction; requires filing a <i>certification of micro entity status</i>). Provisional filing fee (\$65 micro / \$130 small / \$325 large). Non-provisional basic filing + search + examination fees combined: ~\$400 micro / ~\$800 small / \$2,000 large. Basic patent search tools (free or \$50-200). Self-education via online resources.	~\$515-\$665 at micro-entity rates (~\$980-\$1,130 at small entity rates), U.S. only
Solo Inventor (With Patent Attorney)	Attorney fees for application drafting (\$2,000-\$5,000), USPTO fees (\$1,000-\$2,000), possible patent search (\$500-\$1,500).	\$3,500-\$8,500+ (U.S. only)
Startup (Multiple Claims, Complex Tech)	Patent attorney for drafting (\$5,000-\$10,000), office action responses (\$1,500-\$3,000 per response, multiple rounds), USPTO fees (\$1,500-\$3,000), possible international filing (\$5,000-\$15,000 per country).	\$15,000-\$50,000+ (U.S. + International)
Corporate (Portfolio of Patents)	In-house counsel or retained attorneys, maintenance fees over 20 years, annual prosecution cost per patent, international filing and maintenance in multiple countries, enforcement/litigation if needed.	\$30,000-\$100,000+ per patent over full 20-year term

Fee Reductions: Small Entity & Micro-Entity Status

The USPTO recognizes that inventors and small businesses face financial barriers to patenting. They offer **fee reductions** that significantly lower filing costs:

Status	Qualification	Fee Reduction
Small Entity	Individuals, small businesses (fewer than 500 employees), universities, nonprofit organizations. Must file a <i>certification of small entity status</i> (or check the small-entity box in Patent Center) at filing.	60% reduction on most USPTO fees. Example (post-Jan 2025 schedule): provisional drops from \$325 to \$130; non-provisional basic filing + search + examination fees combined drop from \$2,000 to \$800.
Micro-Entity	A small-entity applicant who also meets the income test (gross income in the prior year less than 3x the median U.S. household income—roughly \$241,000 for 2025), has not been named on more than four prior non-provisional applications, and is not assigned to a non-qualifying entity. Universities and inventors assigned to qualifying institutions of higher education also qualify. Must file a <i>certification of micro entity status</i> (Form PTO/SB/15A or PTO/SB/15B) at filing.	80% reduction on most USPTO fees. Example (post-Jan 2025 schedule): provisional drops from \$325 to \$65; non-provisional basic filing + search + examination fees combined drop from \$2,000 to \$400. Total USPTO fees for a simple DIY application: ~\$465.
Large Entity	Corporations and businesses larger than small entity threshold	No reduction. Full USPTO fees: provisional \$325, non-provisional basic filing + search + examination ~\$2,000 combined.

HOW FEE STATUS AFFECTS TOTAL COST

Micro-entity solo inventor filing DIY: Provisional (\$65), non-provisional basic filing fee (\$70), search fee (\$154), examination fee (\$176) = ~\$465 in USPTO fees for a U.S. patent. Realistic timeline and cost for someone with moderate technical knowledge and access to patent drafting resources.

Small entity startup filing with attorney: Attorney drafting (\$3,000-\$5,000), USPTO fees at 60% reduction (~\$800-\$930 including provisional), office action responses (\$1,000-\$2,000) = \$4,800-\$7,900 for a U.S. patent.

Large corporation: Same attorney cost (~\$3,000-\$5,000), but no fee reduction: USPTO fees (~\$2,000-\$2,500 including provisional), office action responses (\$1,500-\$3,000) = \$6,500-\$10,500 for a U.S. patent.

MICRO-ENTITY STATUS: PATH TO AFFORDABLE PATENTS

If you qualify as a micro-entity, you can file your own patent application for under \$500 in USPTO fees—provisional plus the full non-provisional filing-fee package. You'll need to be comfortable with technical writing and patent claim drafting, but it's feasible. Many solo inventors and startups use this path in early-stage development. Don't forget to file the *certification of micro entity status* with your application; without it, you'll be charged at large-entity rates.

Cost-Benefit Analysis: When Is a Patent Worth It?

Patents are expensive. Is it worth it? The answer depends on your situation and the invention. Here are key factors to consider:

- **Market size:** Large addressable market = higher ROI on patent cost. Small niche market may not justify patent costs.
- **Competitive threat:** High threat of copying = strong reason to patent. Low threat (defensible by trade secret) = patent may not be essential.

- **Product lifespan:** If technology becomes obsolete in 3-5 years, a 20-year patent provides protection longer than market demand. If competitive advantage lasts 15+ years, patent is valuable.
- **Funding/licensing potential:** Patents make you more attractive to investors and potential licensees. If you're seeking capital or licensing deals, patents increase valuation.
- **International presence:** Domestic patent alone (U.S.) protects you in the U.S. only. If competitors can copy in Europe or Asia, you need international patents (\$20,000-\$50,000+ additional).

COST-BENEFIT EXAMPLE 1: STARTUP TARGETING VCS

Scenario: You develop novel RF circuit technology and seek venture funding.

Patent investment: \$10,000 (attorney-drafted U.S. patent)

ROI: Investors perceive strong IP protection, increasing valuation by \$1M+. Patent becomes core asset. If company raises \$5M Series A, patent investment pays for itself many times over.

Verdict: Patent is essential.

COST-BENEFIT EXAMPLE 2: SOLO INVENTOR, NICHE PRODUCT

Scenario: You invent a specialty mechanical widget for a small hobby market (~100 potential users globally). You want to sell directly without competitors.

Patent investment: \$3,000-\$8,000 (with attorney)

Market revenue potential: \$50,000/year (if you capture the entire niche)

ROI: Patent cost is high relative to market size. But trade secret protection is weak—someone buys your widget and reverse-engineers it. Patent prevents copying.

Verdict: Patent is valuable as competitive protection even in niche market.

COST-BENEFIT EXAMPLE 3: LOW-COST, EASILY IMPROVED PRODUCT

Scenario: You invent a minor improvement to a commodity product. Competitors will likely design around your patent or improve faster than your patent examination completes.

Patent investment: \$5,000+

Competitive advantage duration: 6-12 months until competitors improve

ROI: Patent costs more than the competitive advantage window is worth.

Verdict: Patent may not be economically justified; consider trade secrets or agile manufacturing instead.

Decided to move forward? **Module 2 (\$29)** covers documenting your invention, conducting prior art searches, and building the foundation you'll need before writing a single patent claim.

Budget Planning: A 5-Year Patent Development Plan

If you decide to pursue patents, here's a realistic 5-year budget for a startup developing multiple patents:

STARTUP 5-YEAR PATENT BUDGET (3 PATENTS)

Year 1: Foundation (Planning & First Filings)

- Patent attorney consultation (2-4 hours): \$1,000
- Prior art searches for 3 inventions: \$1,500
- Patent writing & prosecution for Patent 1: \$5,000
- **Year 1 total: \$7,500**

Year 2: First Filings & Development

- Patent 2 filing (attorney): \$5,000
- Patent 1 office action response: \$1,500
- Provisional filing for Patent 3: \$500
- **Year 2 total: \$7,000**

Year 3: Prosecution & International Consideration

- Patent 2 office action response: \$1,500
- Patent 1 maintenance fees (approaching): \$1,000
- Patent 3 non-provisional filing (attorney): \$5,000
- International filing (PCT/WIPO) for Patent 1: \$5,000
- **Year 3 total: \$12,500**

Year 4-5: Maintenance & Maturation

- Maintenance fees for granted patents (Years 4-5): \$2,000-\$3,000
- Office action responses as needed: \$2,000-\$3,000
- International patent prosecution (select countries): \$5,000-\$10,000
- **Years 4-5 total: \$9,000-\$16,000/year**

5-Year Total: ~\$43,000-\$55,000 for a 3-patent portfolio with U.S. and selective international protection.

This is a realistic investment for a technology startup seeking to build defensible IP. Adjust based on your specific situation and geographic priorities.

DIY Patent Filing vs. Hiring an Attorney: Trade-offs

Many solo inventors file patents without attorneys to save money. Is this wise? Here are the trade-offs:

Aspect	DIY Filing	Attorney-Drafted
Cost	\$600-\$2,000 (USPTO fees + DIY tools)	\$3,500-\$10,000+ (attorney fees + USPTO fees)
Claim Quality	Inventor's written claims may be weak, vague, or too broad. Risk: claims too narrow (little protection) or too broad (examiner rejects all)	Attorney has experience writing claims that balance breadth and enforceability. Claims more likely to survive examination
Prior Art Search	Inventor may miss relevant prior art, leading to rejection surprise during examination	Attorney conducts professional search, identifies risks upfront
Office Action Response	Inventor may misunderstand rejection, file weak arguments, or miss deadlines	Attorney interprets rejection and files persuasive response with proper legal format
Specification Quality	Risk of insufficient enablement, vague language, missing embodiments	Thorough specification with clear enablement, multiple embodiments, strong examples
Grant Rate	Lower (higher rejection rate due to weaker claims)	Higher (experienced claims more likely to survive examination)
Enforceability	Patent granted, but weak claims mean competitors can easily design around	Stronger patent more difficult for competitors to design around, more valuable in litigation

WHEN DIY MAKES SENSE

DIY filing is reasonable for: (1) Provisional applications (less critical; can refine later), (2) Micro-entity solo inventors with technical writing ability, (3) Straightforward mechanical inventions with clear prior art landscape, (4) Situations where a weak patent is better than no patent at all due to budget constraints. DIY is risky for: (1) Complex software/biotech inventions, (2) Inventions in crowded patent fields, (3) Situations where patent will be enforced (weak claims fail in litigation), (4) Startup seeking investment (investors prefer attorney-drafted patents).

PRACTICAL EXERCISE 1.5: PATENT INVESTMENT PLAN

Develop a detailed patent investment plan for your invention or a hypothetical scenario. Include: (1) Timeline from current stage to patent grant; (2) Cost breakdown for DIY vs. attorney-drafted; (3) Fee reduction qualification analysis (small entity vs. micro-entity status); (4) 5-year budget including maintenance fees; (5) Cost-benefit analysis—is the patent worth it?; (6) Go/no-go decision with justification. Write a 3-5 page business case for pursuing (or not pursuing) patent protection.

Deliverable: A comprehensive patent investment plan and business case document.

Recommended Resources

Deepen your expertise in Module 1 topics using these vetted external resources.

USPTO Patent Full-Text Databases (PATFT & AppFt)

Official U.S. patent and application databases. Essential for prior art searching, patent analysis, and understanding claim language. Free access to millions of patents.

patft.uspto.gov →

Google Patents Advanced Search

Intuitive interface to U.S. and international patents. Excellent for quick searches, citation tracking, and visualizing patent families. Recommended for beginners.

patents.google.com →

Espacenet (European Patent Office Database)

Access to patents from 90+ countries, including European Patents and PCT publications. Essential for international prior art searching and global patent landscape analysis.

espacenet.com →

WIPO PatentScope (PCT Database)

Patent Cooperation Treaty (PCT) applications filed internationally. Multilingual search interface. Critical for understanding global patent landscapes and international filing strategies.

patentscope.wipo.int →

"Patent It Yourself" by David Pressman (Book)

Comprehensive guide to U.S. patent system, claim drafting, and prosecution. Chapter 2 covers patentability requirements. Highly regarded by independent inventors and DIY filers.

[Nolo Press](#) →

USPTO Examination Guidelines (MPEP)

Manual of Patent Examining Procedure. Official guide examiners follow for patentability decisions. Chapter 2100 covers patentability and prior art. Dense but authoritative.

mpep.cto.uspto.gov →

Nolo Patent & Trademark Guides

Practical, accessible guides to patents, trademarks, and intellectual property. Covers provisional applications, DIY filing, and cost management for small inventors.

nolo.com →

Ready to File Your Patent?

Module 1 gave you the foundation. Modules 2-6 take you from documenting your invention through filing, prosecution, international strategy, and monetization.

Next: Module 2 (\$29)

Decision Flowchart (\$9)

Boot Camp Patent Module 1: Patent Fundamentals

Taught by The BCP Team | Waveform Holdings LLC

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