

Digital Infrastructure Securitization Rating Criteria

Sector-Specific

Scope

This report details Fitch Ratings' methodology for assigning and maintaining credit ratings to structured finance obligations where repayment depends upon cash flow from the ownership and/or operation of digital equipment and property. Given the interconnected nature of these assets, they are commonly referred to as "digital infrastructure". Such assets include wireless towers, small cell networks, data centers, fiber network assets and related assets that are integral to transmitting data and creating digital networks.

These criteria detail the Credit Risk Factors (CRFs) that inform Fitch's assumptions for rating digital infrastructure securitizations. The criteria are global and provide a framework to rate transactions backed by assets with the same underlying technological and credit fundamentals.

Fitch expects collateral assets to have a demonstrated operating history. Transactions with significant construction or completion risk and no operating history will be rated in conjunction with Fitch's "Infrastructure & Project Finance Rating Criteria" to assess these additional risks. Similarly, digital infrastructure projects sponsored by municipal or government-related agencies would follow global infrastructure or public finance criteria.

Key Rating Drivers

The importance of individual and aggregate rating drivers varies between transactions and sectors. In addition, the importance of these factors may change over time. Generally, factors that are significantly weaker than others attract more weight in the analysis. Not all rating factors outlined in this report will apply to each rating; the rating action commentary or rating report will discuss the most relevant factors.

Fitch Net Cash Flow: Fitch adjusts issuer-provided, contractual or historical net income to levels deemed sustainable over the transaction's lifetime. Common revenue "haircuts" reflect technology, tenant credit and lease renewal risk. Fitch also normalizes capital costs and adjusts operating expenses, including management fees, based on historical performance and market data.

Leverage Multiples: Rating-specific leverage is a function of Fitch net cash flow (FNCf) and asset class-specific leverage multiples. Multiples indicate the maximum potential leverage (MPL) for the rating. Cumulative leverage at a given rating is subject to a repayment analysis, which may deterministically stress asset class-, rating- and transaction-specific factors.

Credit Risk Factors: CRFs are attributes that impair or improve the ability of asset cash flows to repay issued liabilities. As such, they inform FNCf, MPL and the repayment analysis. Categorically, CRFs include: tenancy/payors, collateral, sponsor/manager quality, operating environment and transaction/structure attributes.

Operating Dependencies: Dependency on particular counterparties (e.g. a sponsor or manager) can create credit risk that limits a transaction's reliance solely on asset cash flow to pay notes. Dependencies inform MPL and, if unmitigated, may cap ratings at the sponsor's rating.

Technology Risk, Rating Caps: Given the specialized collateral, potential technological changes and limited visibility of long-term cash flow and value, most digital infrastructure securitizations will not achieve ratings above 'Asf'. Considerations for ratings above 'Asf' include strong tenancy and sponsorship, high-quality collateral, a demonstrated capacity to repay within defined repayment periods or structural features that protect against downside risk.

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This criteria report updates and replaces "Digital Infrastructure Securitization Rating Criteria," dated Sept. 6, 2022.

Applicable Criteria

[Structured Finance and Covered Bonds Counterparty Rating Criteria \(March 2023\)](#)

[Global Structured Finance Rating Criteria \(March 2023\)](#)

Analysts

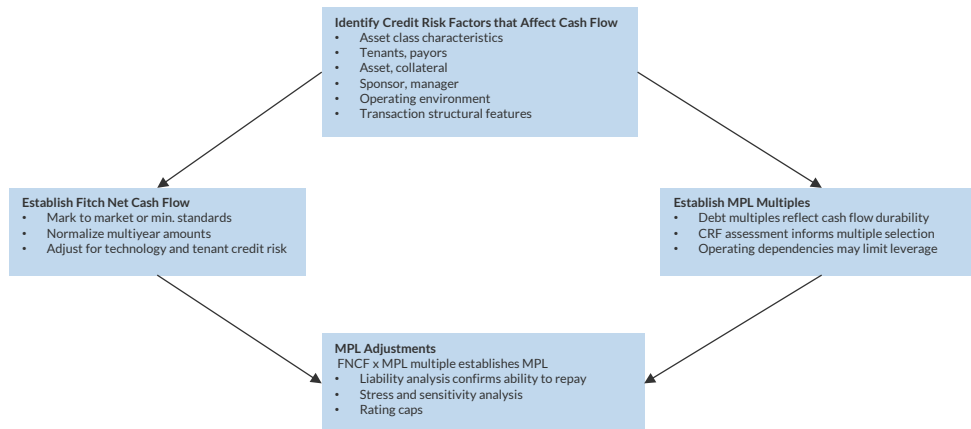
Daniel J. Chambers
+1 312 908-0782
daniel.chambers@fitchratings.com

Robert Buckley, CFA
+1 312 368-3102
robert.buckley@fitchratings.com

Greg Kabance
+1 312 368-2052
greg.kabance@fitchratings.com

Criteria Framework

These criteria outline rating considerations for structured finance transactions where the primary repayment source is cash flow generated from owning and/or operating digital assets. They describe how Fitch establishes assumptions, while the appendices detail Fitch’s established assumptions.



Source: Fitch Ratings

The default risk of the rated notes considers the sufficiency of the issuer’s asset cash flow to repay its liabilities: it consists of both estimating issuer/asset cash flows and testing repayment of the liabilities under various stresses.

The four primary steps in this analysis include:

- **FNCF:** Fitch adjusts contracted, historical or projected cash flow to amounts it deems sustainable over the repayment period (FNCF). Fitch’s assessment of CRFs informs these adjustments.
- **MPL:** Fitch applies leverage multiples to FNCF to determine the upper limit of debt for a given rating category. MPL multiples are informed by Fitch’s assessment of CRFs and limited or mitigated dependence on any particular operator/manager.
- **CRFs:** Fitch identifies sector- or transaction-specific attributes that are expected to improve or impair repayment.
 - CRFs inform Fitch’s view on the amount, timing and certainty of cash flows, which in turn informs the agency’s FNCF assumptions.
 - Fitch’s MPL multiples reflect the agency’s opinion of relative cash flow durability for an asset class — which is also informed by Fitch’s CRF assessment.
 - CRFs inform Fitch’s stress assumptions in the agency’s repayment analysis.
 - The CRF assessment includes both asset and liability cash flows, considering the relative impact of transaction structural features such as amortization, payment priorities, hedges, cash management and triggers.
- **MPL Adjustments:** Rating category-specific debt is limited to the amount of debt that can be repaid per the transaction terms and transaction- or asset class-specific stresses and sensitivities. Ratings and MPL may also be limited, as discussed in the Operating Dependency and Operational Risk Reviews and MPL Adjustments sections of this report.

Establish FNCF

FNCF represents net income deemed sustainable over the life of the transaction, available to the borrower. Issuers typically provide Fitch with “underwritten cash flow” statements based on

contractual amounts owed to the obligor, net operating income projected by the issuer over the transaction's lifetime and amounts observed historically. Fitch also considers information provided by third-party sources. Fitch then adjusts revenue and expenses for three primary reasons:

- **Revenue, Utilization and Expenses Marked to Market Levels:** Line items most frequently adjusted include rent, occupancy/utilization and management fees (to what a third-party manager would charge).
- **Normalized Amounts:** The most frequently adjusted items are leasing costs and long-term capital improvements. While these costs are predictable, the timing is uncertain. Given the limited resources of a special-purpose entity (SPE) borrower, these normalized amounts are expected to be escrowed initially or over time from operating income. FNCF includes adjustments for amounts expected to be escrowed. Rents for investment-grade tenants/payors with leases extending well beyond the loan term (typically 3+ years) are generally straight-lined over the loan term.
- **Technology and Tenant Risk:** Contractual revenue is adjusted to reflect the expectation of collecting contractually owed payments. Considerations include the credit quality of the tenant/payor, relative demand for the tenant's technology (e.g. paging versus cell phone providers) and contract renewal risk over the loan term.

Fitch adjusts issuer underwritten cash flow for nonrecurring items, above-market performance, volatile market conditions, and revenue and expense items that deviate from sustainable long-term market or property levels, and normalizes capex. Such adjustments are commonly referred to as a "haircut" when discussing the overall effect on asset-level cash flow relative to historical results or the issuer's underwritten cash flow.

Revenue Adjustments

Adjustments to issuer-underwritten revenue reflect the probability of renewal versus leases lapsing or equipment reverting to another entity and, if renewed, the rent levels assumed after expiration. Adjustments to contractually provided or issuer-provided estimates of rents/pricing and occupancy/utilization typically reflect the lesser of in-place, market or sustainable levels.

Fitch also adjusts revenue for technology and tenant risk to reflect its view of relative cash flow durability; considerations include long-term demand for the deployed technology, the financial strength of the tenant/payor and lease renewal risk (length of the lease relative to the expected weighted average life [WAL] of the debt).

For examples, see the table in Appendix B, "[Reductions to Revenue – Based on Technology Type, Tenant Rating and Contract Term.](#)"

Expense Adjustments

Asset-level operating expenses are adjusted to reflect historical, market or minimum standards, while capex are normalized to reflect average amounts. Site-level operating expenses and ground rent are adjusted to reflect normalized amounts over the expected WAL of the transaction.

Management fees and maintenance capex are also adjusted to reflect the higher of actual or market amounts, and further stresses are applied to sites subject to short-term ground leases or short-term license agreements.

Other FNCF Adjustments

The FNCF for leasehold or licensed wireless sites that have a fully extended ground lease expiration of less than or equal to the expected WAL is reduced by up to 10%, and the FNCF for leasehold or licensed sites that have a fully extended ground lease expiration between the expected WAL and 15 years from the date of issuance is reduced by up to 5%. There is no additional FNCF stress for leasehold or licensed sites that have a fully extended ground lease expiration of greater than 15 years past the date of issuance.

Fitch excludes revenues and expenses from assets where the issuer's income is limited to a management contract. If a management contract site is experiencing negative cash flow, Fitch excludes the revenue from the cash flow but includes the applicable expenses in its FNCF calculation.

While the adjustments detailed above are the most common, further adjustments may reflect tenant, site, sponsor or asset-specific attributes or other idiosyncratic risks deemed appropriate in estimating sustainable income. This could include, but is not limited to, additional haircuts due to concentration factors, the possibility of a site being decommissioned or technological obsolescence.

Establish MPL Multiples

MPL is the product of FNCF and the MPL multiple and represents an upper limit to the amount of cumulative debt proceeds issued at a given rating category. Proceeds may be limited by Fitch's repayment analysis, including appropriate stress and sensitivity modeling and other constraints discussed in this report.

MPL multiples for a given asset sector are considered relative to wireless towers and assigned ordinarily to reflect Fitch's view of relative cash flow durability. Cash flow durability is considered with respect to both asset cash flows paid to the issuer and the sufficiency of the cash flow to make required transaction payments. As part of this analysis, Fitch considers the adequacy of protection afforded by transaction terms and structural features in assigning MPL multiples.

Asset classes characterized by stronger cash flow attributes generally support higher potential leverage. These include assets that exploit dominant-use technology, have creditworthy payors/tenancy and have a large and growing user base, or benefit from barriers to entry, which limits competition and creates "mini-monopolies". Conversely, assets with specialty- or limited-use technology, non-investment-grade payors, nascent or competitive markets, and quickly growing demographics support relatively lower leverage.

Within asset classes, Fitch's assessment of CRFs informs the multiples selection. Fitch's established MPL multiples for wireless towers, small cell networks and distributed antenna systems, data centers and fiber network assets are included in Appendices B–E.

Identify Credit Risk Factors

The primary rating assumptions for digital infrastructure securitization, FNCF, MPL multiples and the repayment analysis are informed by Fitch's CRF assessment.

- CRFs are attributes likely to impair or improve the ability of the asset cash flows to repay the liabilities. Fitch's assessment of CRFs informs the agency's views on the amount, timing and certainty of cash flows (cash flow durability) and, in turn, FNCF and MPL multiples.
- Fitch considers the presence (or absence) and materiality of the factors, prioritizing those most likely to influence a particular transaction's performance.
- Fitch categorizes CRFs as shown in the tables below, indicating 'stronger' and 'weaker' attributes. The agency's determination of relative strength is made in the context of cash flow durability — attributes likely to improve the amount, timing or certainty of cash flow are considered 'stronger' and attributes likely to reduce, delay or otherwise impair cash flows are considered 'weaker'. Additionally, stronger attributes indicate the higher end of MPL multiples and vice versa.
- Fitch considers attributes both present and absent (if customarily present), as well as the materiality/potential impact on cash flows.
- The results of this analysis inform MPL multiples, FNCF adjustments and repayment stresses and sensitivities.

The primary CRF categories and attributes that Fitch views as stronger and weaker are summarized in the tables below.

Asset Class and Operating Environment Characteristics

Factor	Weaker	Stronger
Industry Structure	Many competitive players of varying sizes	Monopolistic, oligopolistic or limited dominant players within relative marketplace
Threat of Substitutes	Rapidly evolving technology, available alternatives	Limited, distant, high switching costs

Barriers to Entry	Low initial investment	High initial investment, regulatory protection, first-mover advantages
Diversity	Cash flows from limited assets, markets, tenants	Diversified income by asset, location, tenancy
Risk of Obsolescence	Near-term, revolutionary changes, lack of industry standards	No near-term replacements, integral components in a comprehensive network
Churn Rate	Moderate to high, ease of switching, ample alternatives	Low, lack of suitable alternatives
Long-Term Growth Potential	Saturated or fully built markets, limited available spectrum	High demand, ample capacity, financially strong providers
Legal, Jurisdictional and Sovereign	Legal and regulatory ambiguity, limited government commitment, limited levels of international investment	Robust legal regime with demonstrated respect for contractual relationships, consistent application of laws

Source: Fitch Ratings

Higher MPL multiples reflect stronger asset class characteristics. For example, large capital investments and first-mover advantages have created barriers to entry and sectors dominated by a limited number of operators with material pricing power. Additionally, these operators often face limited term risk given the length, diversity and credit strength of their tenancy. However, the lack of long-term visibility into demand for current versions of dominant technology necessitates a focus on amortization, maturity risk and duration, as changes in technology can materially affect the income potential of collateral assets, absent material reinvestment.

Fitch considers the legal system and business environment of the relevant country and region, and it identifies factors that can potentially improve or impair asset cash flow and debt repayment. For example, the agency considers the reliability and creditor orientation of local legal systems, including the clarity of relevant laws and regulations, the degree of regulatory discretion and the sanctity of contractual relationships. Fitch also considers the political and regulatory environment where collateral assets and key parties are located, along with evidence of the government's commitment, public support and consistent application of laws and regulations.

A detailed overview of typical characteristics across digital asset classes is listed in [Appendix A: Asset Class Characteristics Across Digital Sectors](#).

Tenants and Payors

Factor	Weaker	Stronger
Contract Counterparties	Non-investment grade	Investment grade
Contract Length	Multiple required renewals during loan term	Contract expiration after the loan term
Strategic Ties to Property or Location	Limited	Strong
Responsibility for Opex and Asset Maintenance	Landlord	Tenant
Tenant Diversity, Lease Expiration Concentration/Diversity, Diversity of Collateral	Concentration by tenancy, lease expiration, collateral attributes	Diversification limits exposure to event risk, renewing at market troughs
Flat Rent vs. Contractual Rent Increases	Flat	Contractual steps, escalators linked to costs or inflation
Service Level Agreements (SLAs)	Abatement and termination rights, high standards need to be maintained, high penalty rates	Limited ability to abate/terminate lease, limited penalties
Rents/Utilization vs. Sustainable Market Levels	Above-market rents, propensity to reduce over time	Market rents, stable expected rent levels

Source: Fitch Ratings.

The credit risk profile for a secured transaction increases if the tenants default and if debt does not fully amortize from contracted rental income. Stronger tenant/payor attributes reduce the risk-impaired cash flow. Collectively stronger attributes generally result in higher MPL multiples. Typical considerations for contractual income include tenant quality, diversity, lease duration, remaining lease term, renewal probability and cost of non-renewal risk, concentrations of expiring leases, renewal demand, market rents and escalators, occupancy, leasing costs, gross versus net lease structure, and obligor demographics.

Asset and Collateral Quality

Factor	Weaker	Stronger
Age, Condition, Tiering of Collateral	Older technology, limited reinvestment	Newer technology, professionally serviced and continued reinvestment

Accessibility, Proximity, Capacity or Utility of Collateral	Limited access, capacity constraints, limited availability of service providers	Easy access, professionally monitored/managed, proximate to demand drivers/clients
Access to Utilities, Demand Drivers, Appropriate Labor Pools	Limited redundancies, high cost of power, potentially overbuilt, limited availability of appropriately skilled labor	Access to affordable power, redundant power supply, market equilibrium for construction, rents, strong demographics and skilled workforce
Relative Cost of Owning, Operating, Maintaining, Improving	The need for frequent, unpredictable or costly reinvestment or maintenance	Limited need for additional capex, long life assets, competitive servicing environment
Useful Life	Near-term replacement risk, contracts with short lives and material potential for non-renewal	Collateral supports dominant technology with limited obsolesce risk; secured by hard assets such as real estate with long-term cash flow potential
Diversity	Single, binary source of income	Diversified pool of strong property attributes
Availability of Third-Party Property Condition Reports	None, limited scope	Robust in scope, detailed assessment of condition and replacement/maintenance costs

Source: Fitch Ratings

For real property and physical assets, primary considerations in assessing collateral quality include location, access/egress, visibility, age, access to and cost of power, redundancy of systems, security, useful life/condition and amenities. Unlike other real estate assets, demand for digital assets is less a function of quality of finish and aesthetics and more dependent on functionality and services. Some asset sectors have industry-standard tiering, which Fitch considers in its collateral assessment.

Sponsor and Managers

Factor	Weaker	Stronger
Experience with Asset Type, Technology, within Jurisdiction	Limited experience, new venture	Substantial experience and track record for asset class, jurisdiction
Fit with Strategic Objective of Sponsor, Investors	New venture, noncore business, lack of demonstrated commitment to sector or asset	Integral to core strategic goals
Financial Commitment and Flexibility	Limited investment of capital, resources or reputation	Significant equity or investment of resources; demonstrated flexibility to resolve issues
Complexity of Ownership, Potential for Change	Multiple unrelated parties, majority rule for major decisions	Limited number of parties, controlling interest by lead sponsor, alignment of interests, clear control and decision-making
Capitalization, Financial Flexibility	Thinly capitalized, highly leveraged, transactional investment	Sponsor with demonstrated capacity and willingness to invest

Source: Fitch Ratings

Fitch considers the relevant experience of the sponsor and the property manager, and assesses their ability to operate and manage the property professionally. Fitch expects issuer- and sponsor-provided information to detail experience with the subject property type and the local market, current or pending litigation, financial resources relevant to obligations, the depth and breadth of the organization and similar operational issues. For sponsors lacking professional management experience, Fitch expects sponsors to hire capable third-party managers.

Digital infrastructure securitizations are expected to have strong sponsorship. Fitch also views sponsorship risk asymmetrically – while strong sponsorship does not positively affect MPL multiples, the sponsorship concerns will negatively impact MPL.

Transaction and Structure

Factor	Weaker	Stronger
Asset Isolation	Limited asset ring-fencing, operating dependency	True sale, nonconsolidation, separateness covenants
Priority of Payments	Pro-rata pay, limited deleveraging	Sequential pay, release price premiums de-lever with asset sales
Amortization	Limited amortization, repayment period extends beyond asset life or lease term	Asset cash flow repays debt within asset life or contract term
Triggers	Allow for significant decline in asset cash flow before cash is trapped, materiality of binary events to impair cash flow	Equity payments suspended following cash flow events that could impair ratings, debt repaid if not cured in short time frames
Hedges	Substantial unhedged currency or interest rate risk	Currency and interest rate risk are fully hedged or materially mitigated for term of transaction

Source: Fitch Ratings

The presence and sufficiency of structural protections limit the impact of expected and unexpected cash flow volatility. Fitch considers interest rate, currency, sovereign, basis and similar risks relative to liquidity, reserves, hedges and other structural features. Given the importance of Fitch's repayment analysis and the expectation of amortization to mitigate repayment risk, the agency pays particular attention to the efficacy of cash trap and early amortization triggers, hedges and benefits of structure to mitigate asset performance risk.

MPL Adjustments

MPL is the upper limit of debt for each rating category. However, the amount of proceeds issued at each rating category may be limited by the ability of the issuer to meet its liability payments.

Repayment Analysis

The repayment analysis demonstrates the sufficiency of the asset cash flow to meet the payment obligations of the issuer, under issuer-underwritten base case and various Fitch-defined stressed scenarios and in accordance with the transaction's terms. Proceeds or ratings may be also limited by the presence of unmitigated operating dependencies described below and by rating cap considerations.

To assess ratings' sensitivity to the practical limitations of collateral and transaction attributes, Fitch considers one or more repayment analyses to assess the sufficiency of expected asset cash flows to service the proposed liabilities, in accordance with the transaction structure.

In conjunction with each transaction, Fitch expects the issuer to provide a liability analysis that shows the asset's income, liability payments and the transaction's expected amortization, considering criteria stresses and the transaction's structure.

In its repayment analysis and related stresses, Fitch assumes the transaction does not refinance and anticipated repayment date (ARD) provisions, including cash sweep, are triggered.

For transactions where Fitch expects collateral asset cash flow declines from contract expiration, lease defaults or other forms of asset attrition, the repayment analysis includes expected and stressed reductions to the collateral assets and related cash flow, thereby limiting rating category-specific MPL.

Stress Considerations

Fitch's assessment of CRFs identifies factors that may potentially impair asset or liability cash flows. To assess their impact on debt repayment, Fitch may apply asset stresses to price/rent/rate; volume/occupancy/utilization; duration, delays and payment and collection timing; payor credit quality; and capital and operating expenses.

Fitch also considers the sensitivity of liability assumptions on repayment within the terms of the agreement. Liability analysis considers the sensitivity of repayment to transaction structure considerations such as payment priority and triggers, as well as economic variables such as interest rates, currency and other basis risks, the adequacy of hedges (if appropriate) and other qualitative factors.

The types and degree of stress may also reflect CRFs common to a sector or asset class; examples include:

- In sectors where the potential for technological advancement can limit long-term demand for collateral assets, Fitch considers the time to fully amortize the debt relative to the long-term visibility of asset demand and value in this sector. Specifically, 'AAA' and 'AA' ratings for wireless tower transactions are conditioned on the ability to repay within a 15-year horizon.
- In some cases, the digital infrastructure is hosted on property not controlled by the sponsor beyond a lease term, as is the case for indoor small cell networks, and the ability of the collateral assets to perpetuate income is limited by lease non-renewal risk. In these cases, ratings are conditioned on repayment assuming base and stressed levels of lease/contract attrition and tenancy concentration.
- For large tenant/payor/asset concentrations, Fitch considers the transaction's ability to repay assuming the tenant(s) defaults or is downgraded, or an asset attrition occurs;

material concentrations likely cause rating caps or link the transaction's ratings to the tenant's rating.

The ability of notes to repay under these and similar stresses informs Fitch's views of cash flow durability and may ultimately limit MPL at a given rating.

Stress Scenarios

FNCF reflects our estimate of sustainable net cash flow predicated on expected performance over a transaction's lifetime. Fitch stresses primary CRFs to:

- test the ability of the transaction to repay under scenarios tied to specific ratings (**rating stresses**);
- quantify the stress a parameter (or set of parameters) can withstand and still repay (**break-even stresses**); and
- identify the impact on cash flows or ratings from a change in a parameter (or set of parameters) (**sensitivity analysis**).

Because rating stresses are applied to parameters key to the analysis, the factors stressed vary by asset class, obligor and transaction structure. Rating stresses may be designed to address:

- demand risk (including rates, utilization and revenue);
- operating risk (including opex, capex and management continuity);
- counterparty reliance and credit quality;
- interest rates, currencies and hedges;
- default, loss and prepayment — amount and timing;
- degree of coverage using debt service coverage ratios (DSCRs), loan (or project) life coverage (LLCR and PLCR) or equity using loan to value (LTV) hurdles; and
- degree of leverage.

Operating Dependency and Operational Risk Reviews

Discontinuity Risk

For digital infrastructure securitizations, the risk of dependency on a manager, operator, originator, servicer or sponsor to perpetuate collateral asset income can vary depending on the complexity of the technology, as well as the knowledge and expertise needed to operate and maintain the collateral assets.

When operating dependence is high, the securitization cash flows are contingent on the continuity of the operator; if operating discontinuity risk is not sufficiently mitigated, the default probability of the rated notes is likely linked to, limited by or could be capped at the credit of the operator.

The risk of cash flow impairment from operating risk includes the presence and materiality of sponsor/landlord obligations (upfront and ongoing), performance requirements under SLAs, rent termination and abatement provisions, operating responsibilities and expenses, fixed versus variable expenses, operating leverage, specialization of operations and management and funding capital costs of maintaining or replacing equipment, and other capex considerations.

For most digital infrastructure securitizations, Fitch expects operating risk to be sufficiently mitigated. High operating risk would result in lower leverage or rating caps or Fitch may decline to rate the transaction.

Operating dependency and the risk of discontinuity is mitigated when:

- the sponsor has limited performance or expense obligations related to the collateral;
- an operational risk review (described below) concludes the incumbent has the necessary operational skills;
- the operator can be terminated for poor performance and replaced;

- qualified backup operators are identified or available; and
- fees in the transaction are adequate to compensate the replacement.

Operational Risk Reviews

For each transaction, Fitch considers the role of, the operational dependence on and the expertise and capabilities of operational counterparties as it relates to the performance of the transaction. In certain asset classes, a Fitch servicer rating is used in lieu of a transaction-based review.

The objective of this review is to assess the expertise and capabilities of these operational counterparties, as well as provisions for maintaining continuity. Mitigants to continuity risk typically include provisions for backup service providers or an assessment of the depth of qualified and available service providers in the market. Further details on operational risk reviews and servicer continuity considerations are found in Fitch's Structured Finance and Covered Bonds Counterparty Rating Criteria (*Servicing Continuity Risk in SF appendix*).

Typically, in conjunction with Fitch's corporate telecommunications group, Fitch performs management meetings with issuer/operators and their management for new ratings and periodically, as determined by Fitch analysts, for repeat issuers. Management meetings focus on financial and operational overviews. Among other areas, Fitch reviews the corporate and capital structure of issuer and the operational processes for accounting, credit, property management, leasing, site maintenance, human resources and information systems — these are considered in the context of the company's strategic plans and industry trends. Fitch utilizes this information in its assessment of the strength of the management team and in its assessment of ease in replacing management, if warranted.

Structural Features

The presence and relative strength of structural features also influence Fitch's selection of MPL multiples and resulting rating-specific leverage. Structural features are assessed in the aggregate and those most common to digital infrastructure transactions are listed below. To the extent structural protections are limited, or credit risks are not offset by mitigating factors, Fitch would either apply lower multiples or decline to rate the transaction.

Structural features referred to in this section may apply to loans, securitizations or both.

Amortization, Anticipated Repayment Date and Rated Final Maturity Date

Ratings are predicated on an expectation that the debt will amortize if not refinanced earlier. To mitigate refinance risk, most transactions are structured with ARDs of five to seven years. At the ARD, if the debt has not been refinanced, all excess cash flow, after interest and reserves, is applied to principal until fully repaid. The ARD is not a maturity date, and failure to repay the loan at the ARD is not an event of default. Rather, there is typically an increase in the interest rate (post-ARD additional interest) and, with the trapping of all excess cash flow, issuers are strongly incentivized to repay or refinance the debt.

Generally, post-ARD additional interest is paid subordinate in the waterfall (that is, junior to the lowest rated note) and nonpayment of the post-ARD additional interest is not an event of default. Fitch views the subordination of post-ARD additional interest to principal payments as an established market convention. Fitch believes investors do not expect to receive such cash flows and clear and prominent disclosure in the transaction documentation highlights the subordinated nature and exclusion from events of default.

The rated final maturity of the transaction is typically 25 years–30 years from closing. The period between the ARD and the rated final maturity, or tail, is intended to allow the debt to fully amortize. The tail also allows the servicer reasonable time to work out and extend the debt, as well as foreclose and liquidate, if necessary.

Cash Trap, Cash Sweep and Early Amortization Reserves

Debt service reserves, or leverage-based cash trap or cash sweep provisions, mitigate unexpected shortfalls in cash flow relative to unpaid principal. On the occurrence of defined trigger events, such as an increase in leverage multiples, or after the ARD, all excess cash is trapped in a segregated account or swept to pay down principal balances. The issuer receives no residual cash flow until leverage has stabilized at a predetermined level. If cash flow

continues to decline, cash flow will continue to be trapped or swept and, in the case of the former, early amortization triggers apply previously trapped amounts and future excess cash to amortize the transaction. Thus, the leverage-based triggers serve as an early warning system and mitigate the risk of funds being diverted by the issuer.

Liquidity

Servicer advancing, reserves or other liquidity features provide for timely payment of interest in the event of payment default. Liquidity providers are expected to comply with Fitch's counterparty criteria (see "[Structured Finance and Covered Bonds Counterparty Criteria](#)").

In many cases, servicer advancing provides liquidity to the transaction for delinquent debt service and critical expenses. In cases without advancing, Fitch expects a minimum reserve of six months of debt service, transactions fees, operating expense and certain capex. Factors that may affect the six-month standard include the rating of the sponsor, contractual versus operating nature of the revenue and strength of cash management provisions.

Cash Management

Hard lock boxes and central collection accounts under the control of the trustee ensure property cash flows are directed as per the indenture and cash management agreement. With a hard lock box, tenants remit rents directly to an account held and maintained by the trustee or servicer for the benefit of securityholders, rather than to the borrower or its sponsors. Generally, all trust and servicing fees, tax and insurance escrows, principal and interest payments and required reserve deposits are paid before the issuer receives residual cash flow. Cash management structures without a hard lock box (or similar mitigants) typically create a high degree of operating dependence.

Reserves

Reserve accounts, typically funded at closing or over the life of a transaction, are intended to address expected and unexpected events. Upfront reserves are typically collected for real estate taxes, insurance, ground rent, other taxes, levies and assessments and advanced rents. Ongoing reserves are typically collected monthly in an amount equal to one-twelfth of the estimated amounts for the previously listed obligations. Transactions may also include reserves that provide liquidity in the event of payment interruption.

Management Replacement

Digital infrastructure securitizations generally provide for the right, although not the obligation, to replace the operator/manager, if warranted. In most transactions, the servicer or trustee would determine if a new manager is warranted. Additionally, most management agreements are structured to expire monthly, unless renewed by the servicer/trustee, providing an opportunity for the manager to be replaced post-bankruptcy. Prior to replacing a manager, the reasons for the performance decline are assessed to determine whether it is an economic or market issue or a problem unique to the portfolio. A manager replacement review typically is triggered by a DSCR threshold, management default, specified termination events or deterioration in the quality of the portfolio characteristics. Fitch's initial review considers manager strength, the availability of replacement management and the sufficiency of the prescribed management fee.

Insurance Coverage

Transaction documents generally require the issuers to maintain, among others, the following types of insurance coverage for each asset or network:

- commercial general liability;
- umbrella excess liability;
- flood insurance, if collateral assets are located in a flood zone; and
- earthquake insurance, if collateral assets are located in an earthquake zone.

Among other requirements in the transaction documents, Fitch expects property and casualty carriers to have an insurer financial strength rating consistent with its counterparty criteria. The indenture trustee is typically named an additional insured for each policy.

Title insurance is also typically in place for commercial real estate (CRE) collateral, which protects against loss resulting from defects of title and ensures the owner has a right to operate on the site based on local zoning ordinances.

Additional Notes

Many transactions allow for the issuance of additional notes ranking pari passu with, senior to or junior to any previously issued notes under the same indenture. The additional notes may be subject to, among other things, the leverage after the issuance of additional notes not being more than the lesser of the leverage just prior to the issuance of additional debt or at origination, depending on whether there is additional collateral. The ability to re-leverage pledged collateral via future additional note issuances limits the possibility of upgrades.

Estoppels

Issuer diligence generally includes estoppels for ground-leased sites where the landlord typically attests to certain facts about the lease, license or sub-license, including: it is in full force and effect, there are no defaults, the landlord owns the fee interest and notice and cure provisions exist for the lender.

Environmental

In addition to visual inspections performed by operators, database searches for known environmental issues are generally performed by the issuers for real estate-secured collateral assets. Depending on these reviews, an environmental assessment may be deemed necessary by the issuer for certain locations. Based on the findings of environmental assessments, Fitch may assume higher losses to account for any potential environmental concerns.

In certain transactions, particularly those not secured by mortgages, an environmental mitigation reserve may be established at closing to pay the cost of environmental remediation service. When the findings of the environmental report indicate remediation, a lack of an environmental mitigation reserve is viewed unfavorably.

Non-Static Transactions

For transactions with revolving periods, variable funding notes, earnouts or prefunding, Fitch generally assumes changes to the collateral allowed under eligibility criteria will occur; similarly, changes in cash flow and leverage are assumed to adversely migrate to prescribed limits.

Requested Issuer Information

Fitch relies on information provided by the issuer, arranger, engineers or consultants and in the public domain, as well as reputable third-party sources to set its rating assumptions, establish sustainable cash flow, rating stresses and determining acceptable leverage. Data robustness is considered in developing rating assumptions for new asset classes and in establishing credit risk factors most appropriate for a given rating.

For digital infrastructure securitizations, Fitch expects to receive:

- a data tape of key transaction, property and contract-specific fields;
- the issuer's underwritten run-rate NCF;
- detailed operating expense and maintenance capex information;
- descriptive materials about the collateral;
- third-party reports completed within the prior 12 months, including any environmental reports, title policies and/or lien searches, as requested;
- key transaction documents including offering materials, trust documents, the transaction summary and, when necessary, specific transaction and supporting documents. Examples include loan, intercreditor, management and cash management agreements;
- background information on the transaction sponsor(s) and tower site manager(s);
- three years' historical operating performance for the subject properties;
- three years' audited financials of the transaction sponsor(s);

- a liability analysis demonstrating repayment of the proposed capital structure relative to defined stresses; and
- tenant leases, ground leases, licenses and sub-licenses (or estoppels), as applicable.

For its post-closing reviews of transactions, Fitch considers the performance, remittance and collateral information reported by the servicer and/or the trustee. Fitch also requests an updated data tape containing current tenant-level revenue data and asset-level operating expenses.

The above information is commonly requested and is considered in Fitch's cash flow analysis and leverage considerations. In some cases, Fitch may request supplemental information — or assume certain stresses in its repayment analysis — based on transaction-, loan-, borrower-, collateral-, tenancy- and ownership-specific attributes. To the extent information is limited or lacking and not offset by substitute information or mitigating factors, Fitch may apply more conservative leverage assumptions, decline to rate the transaction or withdraw existing ratings.

Surveillance

Fitch reviews each transaction at least annually, although more frequently if warranted, and considers rating changes when rating-specific MPL differs materially from class balances, typically by one rating category or more. Rating reviews may also result from changes in a major tenant's credit rating, breaches in performance triggers, transactions entering the ARD or similar events.

Changes in class balances are often the result of amortization, loan repayment and realized losses. Changes in MPL typically result from sustainable increases or decreases in cash flow from levels at either origination or the most recent rating action. These cash flow changes typically result from changes in occupancy and use levels, rents, contract/lease expiration and payment terms and values.

Other factors include change in loan status, increased defeasance or significant loan repayments.

Fitch expects to see sustained improved performance prior to upgrading to avoid or reduce ratings volatility. Decreases in cash flow may not warrant downgrades if the decline is not deemed sustainable, is expected to be temporary or if the current cash flow is not reflective of recoverable value.

For transactions with the ability to issue additional debt in the future, upgrades are generally not considered.

To the extent there are not material migrations in the performance, cash flow and collateral asset characteristics, Fitch will likely rely on its prior analytical assumptions for surveillance.

Criteria Disclosures

In addition to the analytical considerations and rating commentary routinely described in Fitch's rating reports and RACs, Fitch expects to disclose in its initial rating reports any rating cap applied, the leverage statistics for each rated tranche and the extent to which exposure to nontraditional technology is a key rating driver. Fitch's analytical adjustments are disclosed in its rating action commentaries.

Variations from Criteria

Fitch's criteria are designed to be used in conjunction with experienced analytical judgment exercised through a committee process. The combination of transparent criteria, analytical judgment applied on a transaction- or issuer-specific basis and full disclosure via rating commentary strengthens Fitch's rating process while assisting market participants in understanding the analysis behind the agency's ratings.

A rating committee may adjust the application of these criteria to reflect the risks of a specific transaction or entity. Such adjustments are called variations. All variations will be disclosed in the respective rating action commentaries, including their impact on the rating where appropriate.

A variation can be approved by a ratings committee where the risk, feature or other factor relevant to the assignment of a rating and the methodology applied to it are both included

within the scope of the criteria, but where the analysis described in the criteria requires modification to address factors specific to the particular transaction or entity.

Limitations

Ratings assigned by Fitch, including Rating Watches and Outlooks, are subject to the limitations specified in Fitch's Ratings Definitions page on Fitch's website at www.fitchratings.com. Payment of post-ARD "additional interest" is excluded from Fitch's ratings.

Attributes of 'AAA' Rated Transactions

Due to the specialized nature of the collateral and the potential for advancements in technology to affect long-term demand for digital infrastructure, Fitch does not expect most transactions to achieve ratings above 'A'. Ratings as high as 'AAA' have been assigned to transactions demonstrating exceptionally strong tenant/payor, collateral, portfolio, sponsorship, amortization and transaction attributes.

Transactions rated 'AAA' generally include several of the following attributes: high percentage of investment grade tenants, ability to amortize within defined timeframes, highly adopted technologies, long-term leases, senior-perfected security interest in the real property and/or fixtures in addition to equity pledges, title insurance, high demand markets, properties with alternative use and comparable rents.

In most cases, 'AAA' and 'AA' ratings are conditioned on the presence of an investment grade-rated sponsor. Exceptions will be considered for transactions with de minimis operating risk and secured by collateral assets with strong long-term value visibility. Examples may include colocation and powered shell data centers with demonstrated alternative uses as office or industrial real estate.

Rating Assumption Sensitivity

Defined Sensitivities

(% Change in FNCF)	Additional Haircut Needed to Downgrade		
	One Full Category	To Non-Investment Grade	To CCCsf
Sample Pool 1			
Asf	7	16	38
BBsf	9	—	18
Sample Pool 2			
Asf	7	16	39

Source: Fitch Ratings

This section of the report provides greater insight into the rating sensitivities when applying various deterministic stresses. Fitch stressed FNCF in a hypothetical wireless tower transaction to derive the defined sensitivities and defined stresses. The results should only be considered as potential outcomes given that a transaction may be exposed to a variety of additional risk factors that are all dynamic variables

Defined Stresses

Scenarios	-10%	-20%	-30%	+20%
Sample Pool 1				
Asf	BBB-sf	BB+sf	B+sf	Asf
BBsf	Bsf	CCCsf	CCCsf	BBBsf
Sample Pool 2				
Asf	BBB-sf	BBsf	B+sf	Asf

Source: Fitch Ratings

Defined Sensitivities

Defined sensitivities describe the stresses to the assumptions required to reduce a rating by one full category, to non-investment grade and to 'CCCsf'. The variable being stressed is FNCF, which includes adjustments for technology type, tenant quality and contract term. The implied rating sensitivities are only indicative of some of the potential outcomes and do not consider other risk factors to which the transaction is exposed.

Defined Stresses

As FNCF is the only assumption expected to change over time, defined stresses reflect reductions to FNCF of an additional 10%, 20% and 30% at the time of issuance. Declines to FNCF result in higher leverage and lower ratings. Fitch also discloses one or more positive adjustments to FNCF (20%). Given that most transactions reflect the ability to issue additional notes in the future without the benefit of additional collateral, improvements in FNCF would not necessarily warrant positive rating actions.

Rating Sensitivities

Factors that would lead to positive rating actions include deleveraging due to prepayments, amortization and defeasance, as well as positive cash flow trends in the pool. However, upgrades are unlikely given both the potential for additional issuance and rating caps, typically at 'Asf'.

Factors that may lead to negative rating actions include declining cash flows, increased leverage, tenant rating downgrades, increased tenant concentrations and other aspects of the key rating drivers discussed in this report.

Appendix A: Asset Class Characteristics Across Digital Sectors

Asset Type	Industry Structure	Threat of Substitutes	Barriers to Entry	Asset Diversity
Wireless – Towers	The market is developed and characterized by a few dominant players of similar size, a few much smaller players and unsophisticated owners of a limited amount of towers.	Suitable substitutes remain limited given consumer demand for both speed and reliability. Other alternatives include Wi-Fi and satellite transmission, both of which provide limited if any competition.	High barriers to entry given significant barriers to build towers and the market power of incumbent operators. Broadcast spectrum is also typically regulated by the government.	Assets consist of a large and diverse pool of standalone tower, rooftop tower or structure tower assets. In some cases, the asset may also be the fee or easement interests in the land beneath these assets.
Fiber Network Assets	Ranges from monopolistic to oligopolistic.	Transmission of data at comparable speeds may be achievable by alternative technology currently being deployed, but only to a limited extent. Some asset classes such as dark fiber may not have viable substitutes.	High barriers to entry given designation required to operate lines and governmental reluctance to allow more than one provider along certain routes and in certain geographies.	Assets consist of miles of fiber lines comprising one broader network or a combination of several smaller fiber networks. Assets can be concentrated in one geographic region.
Data Centers – Wholesale	The market consists of many competitive players of various sizes. This market is much more competitive than other asset classes in the sector, resulting in competition and less durable cash flow.	The threat of competing data centers is moderate. Other competing data centers can poach tenants fairly easily. This occurs less frequently than in other CRE sectors, but still occurs.	Barriers to entry are relatively low. However, there are some advantages to moving early given interconnectivity benefits and proximity needs.	Asset diversity is limited given the collateral may consist of one or a few assets.
Wireless – Small Cell and DAS	The market is developed and characterized by a few dominant players of similar size.	Suitable substitutes remain limited given consumer demand for both speed and reliability. Other alternatives include Wi-Fi and satellite transmission, both of which provide limited if any competition.	High barriers to entry given designation required to operate lines and/or exclusive contract rights. Significant first-mover advantage given capital outlays and limited need for multiple networks in designated areas.	Assets consists of a large and diverse pool of indoor and outdoor small cell networks. While diverse, these asset pools are smaller than wireless tower pools and have greater geographic concentrations.
Data Centers – Colocation	The market consists of many competitive players of varying sizes. This market is much more competitive than other asset classes in the sector, resulting in competition and less durable cash flow.	Threat of substitutes is moderate to high as colocation tenants switch services from these assets to cloud providers, which operate in hyperscale data centers.	Barriers to entry are relatively low. However, there may be significant advantages to moving early given interconnectivity benefits and proximity needs.	Asset diversity is limited given the collateral may consist of one or a few assets.

Source: Fitch Ratings

Asset Class Characteristics Across Digital Sectors

Asset Type	Risk of Obsolescence	Churn Rate	Long-Term Growth Potential
Wireless – Towers	Risk of technological obsolescence remains limited, given these assets are an integral component in a comprehensive wireless network.	Churn rates have historically been 1%–2%. Churn is typically the result of mergers and acquisitions between wireless carriers. While the effects of the T-Mobile/Sprint merger will continue to be felt, stabilized churn rates are expected to remain low.	Long-term growth potential is somewhat limited. While the sector has experienced strong growth, investment in new wireless towers is expected to moderate as the majority of new investment is expected to occur on new equipment and spectrum. The wireless tower sector has become a mature industry.
Fiber Network Assets	Risk of obsolescence is very limited. Technology deployed reflects few alternatives. Increasing data speeds from telecom carriers and new entrants may cause competition; however, these are ultimately supported by fiber cables.	Churn rates are very low given a lack of suitable replacement options. To the extent churn occurs, it is typically due to physical migration or digital migration between solutions. In either case, a new customer typically replaces the previous customer, limiting net churn.	Prospects for long-term growth remain strong as the growth in internet and data usage continues to grow. Given an increasing suite of services and consumer demand for more services and faster speeds, this sector is expected to continue to grow.
Data Centers – Wholesale	Risk of an alternative being developed is low. There is some risk of continued improvement of data centers over time, which could increase economic or physical vacancy, while maintenance of capex levels may be higher than expected. However, this is mitigated to some extent by strong sector growth and the need for area-specific asset deployment.	Churn rates have historically been low. However, data are limited given the relatively recent development of the sector and a limited number of observations. Churn rates are also far higher than those observed in the wireless tower sector.	Long-term growth prospects are strong, given edge data centers are important to support fast transmission of data and deliver the amount of data necessary to support consumers' increasing usage of data.
Wireless – Small Cell and DAS	Risk of technological obsolescence remains limited, as these assets are an integral component in a comprehensive wireless network.	Churn rates are low and have historically been lower than for wireless towers. However, data are limited given the relatively recent development of the sector and a limited number of observations.	Prospects for long-term growth are strong given higher demand for data speeds and a growing series of devices. Small cell assets stand to benefit as wireless networks continue to densify to deliver faster services.
Data Centers – Colocation	Risk of obsolescence is moderate. While data centers asset technology is unlikely to be replaced, colocation tenants are switching to cloud providers, resulting in additional churn in this particular asset class.	Churn data are limited given the relatively recent development of the sector. Observed churn rates are higher than those observed in the wireless tower sector and have been as high as 7% per annum.	Long-term growth prospects are limited for this asset class. While there is demand for data center space, growth in the sector has been largely driven by wholesale and hyperscale data centers.

Source: Fitch Ratings

Appendix B: Wireless Tower

Collateral Characteristics and Rating Assumptions

Wireless towers are shared telecommunications infrastructure assets, which support deployment of an essential service to end-users. These assets are critical to deploying data over spectrum and provide phones and other digital devices internet access.

For the purposes of this criteria, wireless towers include monopole towers, guyed towers, lattice towers, rooftop towers, structure towers and the land beneath towers. Carrier tenants hang or place their wireless broadcasting equipment on these wireless towers or sites and pay the owner for the ability to do so. Typically, payment includes a fixed rental rate in addition to some or all of the costs associated with operating a wireless tower.

A vast majority of revenues come from one or a few large providers or telephony or data service, which typically carry investment-grade ratings. There is also some incremental revenue from television or radio broadcast tenants, paging tenants or other tenants, which can include mobile radio service, fleet management service and emergency management services.

Wireless Towers: MPL Multiples

Rating Category	Mortgage Multiples		Non-Mortgage/Equity Pledge Multiples	
	High	Low	High	Low
AAAsf	7.50	5.00	6.25	4.25
AAsf	9.00	6.00	7.25	4.75
Asf	10.25	6.75	9.00	6.00
BBBsf	11.75	7.75	10.00	6.50
BBB-sf	12.50	8.50	10.75	7.25
BBsf	14.50	9.50	12.00	8.00
Bsf	17.00	11.50	15.25	10.25

Source: Fitch Ratings

The table provides a range of MPL multiples Fitch expects to use for Wireless Tower transactions; for transactions with mortgage and nonmortgage collateral, MPL multiples are applied on a weighted average (WA) basis. Fitch's selected MPL multiples reflect an aggregate assessment of collateral characteristics as highlighted in its presale reports; to the extent MPL multiples are outside this range, the variation will be described in Fitch's rating commentary.

Security Interest – Mortgage and Equity Pledge Considerations

Wireless transactions are typically secured by mortgage liens on substantially all the tower assets as well as a pledge of the sponsor's equity in the entities that own the towers. Having both types of security interests provides the servicer flexibility should enforcement be necessary.

With mortgages, the security interest consists of a first-priority perfected lien on the land, if applicable, and improvements, as well as an assignment of tenant leases and all rents and revenues associated with each of the towers owned by the mortgage borrower.

Most wireless transactions are also secured by a first-priority perfected security interest in the equity of the SPEs that own the borrowers and the asset-level issuer SPEs, as well as a pledge of all assignable personal property (parent-level pledge).

While mortgages generally provide the clearest path to recovery, foreclosure can be time consuming and expensive given pool granularity. Enforcement under the equity pledge provides noteholders the economic benefit of owning the towers and the ability to sell the towers or sell the equity ownership without foreclosing on individual sites. Fitch considers other security interests that provide similar collateral protections, including limiting priming liens, publicly recorded notice and the ability to foreclose to be sufficient.

In conjunction with equity pledges, issuers typically provide negative pledges restricting future debt secured by the towers or the SPEs' interests. Additionally, it is common for operating covenants that limit the sponsor from pursuing businesses outside the telecommunications business and total corporate debt, subject to a cash trap.

Fitch expects transactions to be secured by both the security interest in the entities, as well as in the assets and in any case, Fitch expects mortgages to be filed for the majority of the assets in a given transaction. A mortgage or local lien filing reduces the risk that another entity could file a lien with a superior position on the collateral assets, provides notice of existing liens and permits lenders to foreclose on individual assets in a pool without taking title to assets that present potential environmental or legal risk. In the rare event a mortgage or first perfected lien cannot be obtained for certain assets, leverage is limited for those assets.

To the extent Fitch deems the lack of a perfected security interest to materially impair potential enforcement actions, Fitch may decline to rate this transaction entirely, absent mitigating factors.

Credit Risk Factors

In determining transaction and class-specific MPL Multiples, Fitch considers the durability of the towers' income stream. The characteristics most frequently used to make this determination include:

- tenant and site diversity;
- number of tenants per site;
- credit rating of tower operator;
- revenue contribution by technology type;
- revenue contribution by tenant;
- WA tenant lease term;
- historical renewal rates;
- asset presence in dense markets (% of annualized run rate NCF [ARRNCF]);
- owned sites (% of ARRNCf);
- leased/easement sites (% of ARRNCf);
- remaining ground lease term, historical renewal rate; and
- transaction structure.

Diversity mitigates event risk that could otherwise impair cash flows and strong operator ratings are credit positive, as each speaks to an operator's relative presence and market leverage. Owned assets or assets subject to long term leases/easements are credit positive relative to collateral rights subject to near-term expiration.

Tenant rental revenue dominated by wireless service providers (WSPs) — versus older or less established forms of technology employed on the towers — is also considered credit positive. WSPs are generally more highly rated than other data providers. Additionally, diversification provided by multiple WSPs reduces the risk of a tenant's rating downgrade risk or changes in its business plan.

Fitch views cash flow characteristics of telephony tenancy more favorably than other technologies. While most wireless transactions have some broadcast tower exposure, transactions with exposure greater than 10% have had investment-grade broadcast tenancy or rental income from non-broadcast tenants on the broadcast towers.

Density is a key component of collateral quality — as the more wireless consumers in a given trade area, the stronger the tower space demand. The primary measure of market density in the U.S. is the number of wireless consumers in a given Basic Trading Area (BTA); Fitch's MPL multiple selection considers the proportion of collateral in the largest BTAs.

FNCF Considerations

The table below lists the most common adjustments applied to wireless tower revenues based on technology demand, tenant creditworthiness and contract term. The relevant technology types and rationale for the magnitude of haircuts are provided below. Also highlighted below are bespoke expense and FNCF adjustments.

Reductions to Revenue — Based on Technology Type, Tenant Rating and Contract Term

(%)			
Technology Type	Long-Term IG Contract	Long-Term Non-IG Contract	Short-Term Tenants'
	Term of \geq WAL + 3 Years	Term of \geq WAL + 3 Years	(IG or Non-IG) Contract Term of < WAL + 3 Years
Telephony/Data	2.0	5.0	7.5
Broadcast	2.5	10.0	20.0
Other	5.0	20.0	40.0
Paging	50.0	75.0	100.0
Ground Lease — Multiple Tenants ^a	0.0	0.0	3.75

^aFor ground lease sites with one wireless tenant, the reduction to revenue will be based on the wireless tenant's technology type. IG – Investment grade. WAL – Weighted average life.

Source: Fitch Ratings

Telephony

Telephony tenants provide wireless communications services such as voice and data that are relatively more stable than other tenants' revenue due to strong customer demand, the mission-critical nature of the towers, oligopolistic industry attributes, high switching costs and network reconfiguration costs.

Data

Established data tenants, further along in the build-out of their footprint for providing data, are treated as telephony tenants since they provide advanced internet and data services to wireless subscribers. Companies that provide data services considered to have a more speculative business plan by Fitch will be classified as "other" in its rent stress assumption.

Broadcast

Broadcast tenants distribute television or audio radio content. As consumers increasingly access television content from cable and satellite providers, Fitch views broadcast tower rents are less durable than other technologies.

Paging

Paging services, involving one- or two-way signal transmission from a base station to a paging unit, have experienced declining subscribers, relative to a growing business need for employees to have wireless phones. Revenue from paging tenants is de minimis in Fitch-rated transactions and the agency expects demand to continue falling.

Other

Tenants classified as "other" provide or use mobile radio services, including fleet management services, emergency services, dispatch services and utilities that communicate billing information through wireless transmission.

Expense Treatment

Management Fees

Management fees are adjusted to the higher of the contractual or market levels. In the US, market is typically 5.0% of revenue; for non-traditional collateral, Fitch considers fees of 7.5% or higher.

For ground lease or land sites where the borrower leases the ground to a tower operator or third-party, the management responsibility is limited and Fitch assumes management fees at the higher of 1.5% or the contractual percentage of revenue.

Capex

Annual capex are also averaged over the expected WAL starting at \$700 per tower site (\$350 for rooftops, water towers or similar structures), generally inflated at 3%. Fitch does not assume capex for ground-leased or land sites.

Appendix C: Small Cell Networks and Distributed Antenna Systems

Collateral Characteristics and Rating Assumptions

Wireless network sites, commonly known as small cell wireless technology or distributed antenna systems (DAS), support the transmission of wireless signal in areas where the reach of traditional towers is limited due to physical obstructions. These networks include “indoor” assets often installed in sports arenas, light rail systems and office buildings – typically related to a specific venue – as well as “outdoor” assets installed in dense urban metro areas, complementing wireless tower assets with similar carrier quality and diversity. The network systems are collateral for the transaction, secured by Uniform Commercial Code (UCC) filings against supporting contracts, and an equity pledge from the entities that own the assets.

While DAS shares technology similar to wireless towers, the securitized receivables have potentially greater cash flow uncertainty relative to wireless tower mortgage loans. DAS is typically installed on existing property, equipment or fixtures pursuant to a license, lease or similar agreement; because the network operator often does not own or control the site, the operator’s ability to perpetuate income and maintain MPL is subject to license renewal at expiration. Outdoor DAS assets carry the same rights as public utilities and cash flow can be generated in perpetuity, subject to regulatory compliance and modest payments. Wireless Tower assets are typically owned outright or subject to ground leases with long-dated maturities and several renewal options.

Certain types of indoor DAS contracts are more likely to face non-renewal risk, such as stadiums, public venues and other large concessions. Additionally, some indoor DAS licenses contain provisions that cede control of the network assets to the landlord at the expiration of the license. The potential for cash flow attrition and heightened leverage warrant additional lease analysis and liability sensitivity.

The table below provides a range of MPL multiples Fitch expects to use for small cell network and DAS collateral and will be informed by CRFs.

Small Cell and DAS – MPL Multiples

Rating Category	High	Low
AAAsf	—	—
AAsf	—	—
Asf	9.00	6.00
BBBsf	10.25	6.75
BBB–sf	10.75	7.25
BBsf	12.25	8.25
Bsf	14.00	9.50

Source: Fitch Ratings

DAS MPL multiples are lower than those for wireless tower collateral given the potential for cash flow attrition over the extended term from licensed locations, shorter operating history, a smaller pool of replacement managers, lower margin business and given the higher potential for the functional obsolescence of the supporting indoor DAS venue.

The potential for contract attrition also necessitates the need for cash flow modeling and liability analysis.

Credit Risk Factors

In determining transaction and class-specific MPL Multiples, Fitch considers the durability of the assets’ income stream. The characteristics Fitch most frequently uses to make this determination include:

- tenant and site diversity contract expiration schedules;
- revenue contribution by telephony tenants in aggregate;
- revenue contribution by indoor and outdoor licenses;

- revenue contribution by largest tenants;
- revenue contribution by indoor, outdoor sites;
- average remaining license term, historical renewal rate;
- remaining sub-license term, historical renewal rates;
- allowable broadcast frequencies;
- credit rating of network operator;
- asset ownership/reversion at lease expiration; and
- transaction structure.

FNCF Considerations

Adjustments most commonly applied to small cell networks and DAS are consistent with haircuts applied in the wireless tower space given similar tenant dynamics and technology types. The table in the Wireless Tower Appendix, “Reductions to Revenue — Based on Technology Type, Tenant Rating and Contract Term,” also applies to small cell networks and DAS, and the relevant technology types and rationale for the magnitude of haircuts are discussed in that appendix. Also highlighted below are bespoke expense and FNCF adjustments.

Expense Adjustments

Fitch considers contractual management fees, as well as higher amounts third parties would charge under enforcement scenarios, the availability of third parties and other business factors in its FNCF adjustments. Management fees have historically been adjusted to 10.0% for these assets to account for market standards.

Capex adjustments are typically limited for DAS assets, as the majority of capex are typically paid upfront and maintenance of capex needs is generally minimal. To the extent specific contracts reflect differences in expense pass-throughs, Fitch may adjust its expense assumptions.

Appendix D: Data Centers

Collateral Characteristics and Rating Assumptions

Data centers are real estate facilities that house computer servers and network equipment within a highly secure environment with redundant mechanical, cooling, electrical power systems and network connections. Data centers are typically classified into one (or more) of the following categories based on size and power capacity, location and owner's business model:

- hyperscale;
- turnkey;
- powered shell;
- colocation;
- enterprise; and
- wholesale.

Hyperscale

Hyperscale data centers are typically purpose built for individual users, often to support cloud and big data storage and characterized by thousands of servers linked with an ultra-high speed, high fiber count network; a noticeable difference between enterprise and hyperscale is the high fiber count utilized.

Given the size and cost to build, conventional leases are long-term, non-cancellable and often guaranteed by investment grade lessors. Given the leverage and credit-linked characteristics, debt secured by hyperscale data centers would typically be rated under Fitch's "[Single- and Multi-Name Credit-Linked Notes Rating Criteria](#)."

Turnkey Data Centers

Some data center landlords focus on built-to-suit 'turn-key' facilities, where landlords invest significant capital (upwards of \$800 to \$1,500 per square foot) to build out a state-of-the-art data center facility with all of the infrastructure — but no servers or related equipment which are supplied by tenant. Most often 'turn-key' space is developed by landlords who specialize in data center construction, maintenance and leasing. The landlord's substantial costs typically result in much higher relative rents. Turnkey data centers are often leased on a gross basis requiring the landlord to pay most operating expenses other than utilities, though triple net (NNN) leases are also common.

Unlike powered shell centers, tenant leases at turnkey data centers often include SLAs that require the manager to provide uninterrupted levels of electricity, access and cooling to the tenant. In support of that requirement, the landlord provides backup batteries and generators. SLAs also provide rent abatement or other remedies if prescribed landlord service levels are not met.

Powered Shell

Owners of powered shell data centers typically lease to a single tenant the building 'shell', including power and fiber connectivity, for initial terms often excess of 10 years. Tenants install their own equipment which may include redundant power, cooling and other technology. Leases are conventionally NNN, meaning tenant is also responsible for all operating and maintenance capex, including electricity. Given the tenant's responsibility for systems and equipment, landlords have limited ongoing obligations or SLAs. Powered shell facilities are typically leased to tenants that operate Colocation or Enterprise Data Centers.

Colocation Data Centers

Colocation centers, house a subtenant's servers and networking equipment in a facility leased to and often managed by third parties. To ensure its critical, redundant or disaster recovery systems are adequately powered, an organization rents space in a shared colocation facility. These organizations can maintain full control over their equipment, have shared access to reliable power, cooling, bandwidth and data center floor space in a secure location. Colocation centers are often proximate to major fiber, improving speed and reducing latency; interconnection is a large driver of demand for colocation space.

Advantages of colocation centers include scalability, security and continuity for relatively smaller users, eliminating the need to build and staff its own facility; additionally, colocation providers often provide a range of management and oversight services and connectivity options.

Colocation users may be tenants of an owner/operator, or subtenants of an operator that leases a powered shell from the landlord, where reliance on the operator presents operational risk considerations; the primary difference is the power and fiber capacity.

Enterprise Data Centers

Similar to hyperscale, enterprise data centers are typically built to suit, customized for an organization's network needs, applications and processes and at a site chosen based on the users' power and connectivity preferences.

Wholesale Data Centers

Wholesale data center operators maintain the facility's infrastructure, provide physical security and re-lease the site's capacity as it becomes vacant. Wholesale tenants are responsible for the maintenance and management of their racks, storage and networking equipment. This compares to retail colocation facilities, which support subtenants with shorter-term and smaller capacity needs and may offer varying levels of hands-on support and other services. Relative to colocation facilities, interconnection is less important.

When considering MPL multiples Fitch looks first to the borrower/sponsor's relationship to the data center and the operating dependence on the borrower to operate the property. For example, a powered shell property leased to an operator that offers colocation services to subtenants, would likely achieve higher multiples than if the issuer provided colocation services itself given the operating risk and expertise required to provide those services.

Data Centers – MPL Multiples

Rating Category	High	Low
AAAsf	—	—
AAsf	—	—
Asf	8.50	5.50
BBBsf	9.25	6.25
BBB–sf	10.00	6.50
BBsf	11.00	7.50
Bsf	12.50	8.50

Source: Fitch Ratings

Credit Risk Factors

Fitch's selection of MPL Multiples are influenced by collateral characteristics and structural features. Collateral characteristics include:

- tenant ratings, revenue contribution by investment-grade tenants;
- average lease term, remaining lease term, lease expiration schedule;
- tenant diversity, geographic diversity;
- sponsor reliance and operational requirements (service level agreements);
- leased capacity (mega watts (MW));
- % NNN leases;
- facility type;
- owned, leased %; remaining ground lease terms;
- alternative use;
- capex requirements, landlord versus tenant responsibility; and
- transaction structure.

FNCF Considerations

Given the different types of assets, technology deployed and business models for data centers, FNCF is assessed more closely to CRE standards than other digital infrastructure assets.

Rent Recognition

Fitch generally recognizes rent from leases in place from tenants in occupancy and paying rent. Above-market rents are adjusted down to sustainable long-term market levels. This rental rate may be below current market levels if Fitch expects market performance to deteriorate beyond current levels.

For most tenants, consideration of rent steps is limited to near-term (generally, up to six months) contractual increases and by market rents. Fitch may average rents over the lesser of the loan term and the lease term for investment-grade tenants or other tenants with highly durable income characteristics, provided the average is not above market.

Vacancy

Fitch adjusts income to reflect stabilized vacancy consistent with historical levels, projections of future vacancy levels or an assumed minimum of up to 10%, depending on the property type. Fitch focuses on economic vacancy, which, in addition to physically vacant space, includes concessions, market rent adjustments, occupancy cost adjustments for retail properties and management units. Exceptions to minimum vacancy amounts include demonstrated long-term property or submarket performance and for investment grade tenants with long-term leases.

Management Fee

Fitch adjusts management fees to the higher of the contractual fees and market levels. Typical management fees are 3%–6% of effective gross income.

Operating Expenses

Issuer-underwritten operating expenses, as well as expense trends and margins, are reviewed for reasonability. FNCF typically reflects the most recent year-end amounts or TTM levels, plus 3%, and variable expenses are normalized to sustainable levels. For declining expenses, Fitch may request supporting information, such as paid bills or insurance premiums. Particular attention is paid to potential expense increases, such as ground lease payments, payments in lieu of taxes, tax abatements and reassessments arising from property sales.

Capital Items

Leasing Costs

Fitch assumes tenant improvements (TIs) and leasing commissions (LCs) at market levels and conventions, normalized over the average lease term. TIs are dependent on the type of facility, the length of the lease and 50%–100% of one-year's rent for a new tenant, and 50% of that amount for a renewal is typical. For LCs, Fitch assumes 4%–5% of one year's rent for new tenants and typically half that amount for renewals.

Replacement Costs

A property's age, quality and engineering evaluation, as well as the owner's contractual obligations are key determinants in estimating replacement costs; these capital amounts are normalized over their useful lives at assumed market costs.

Appendix E: Fiber Network Assets

Collateral Characteristics and Rating Assumptions

Fiber asset securitizations are secured by fiber optic cables, which provide the backbone to support wireless towers, data centers and the internet more broadly. Fiber can be used to transmit data between data centers, to wireless towers and to end-users directly. These fiber networks are supported by contracts to customers ranging from large cloud providers to home internet users, depending on the type of fiber.

The conduit and cable form fiber optic networks host connections that provide an essential service for their users, which in turn lease these networks. Collateral typically also include a first-priority perfected security interest in all of the equity interest in the issuer and the asset entities, along with the obligor's right, title and interest in the fiber assets and the contracts. To the extent additional equipment is necessary to operate the system, this is typically also a part of the collateral package.

Fiber optic networks transmit data using equipment that creates pulses of light that travel through fiber optic cables strung aerially along poles or buried underground. Older wireline technologies such as copper wireline transmit pulses of electricity along strand pairs to achieve the same goal.

Fiber-To-The-Home

Strand counts for fiber networks which provide home internet range from 128 to 288 on the main portion of the network, to one to two strands on the 'last mile' of the network. In either case, fiber optic cables provide internet solutions that are far superior to competing technologies wireline technologies such as cable and copper wire.

Fiber optic cables typically provide speeds of 1 Gbps, which is the highest speed most routers, or comparable wireless tower antennas, can deploy over airwaves. Despite this, fiber optic cables are capable of even faster speeds.

Cable and copper wireline reflect far lower speeds, at approximately 300 Mbps or 100 Mbps, respectively. Furthermore, upload speeds for cable and copper wireline are typically about a tenth of download speeds while fiber upload speeds mirror fiber download speeds. Slow upload speeds limit the ability to fully utilize applications that require uploads, such as videoconferencing.

The Fiber-To-The-Home model requires the owner of the fiber to light the fiber and is more operationally intensive than commercial fiber. In addition, revenue is generated from a large pool of customers along the fiber network, which reflect month-to-month contracts and additional price and volume risk. Contract churn may be slightly elevated relative to commercial fiber and other digital infrastructure assets, but remains quite low, particularly when netting out structural churn, which occurs as customers move on to and off of their network.

Commercial Fiber

Strand counts of high-quality fiber for business solutions range from 432 to 3,456. Fiber optic cables laid underground are run through a conduit and are "dark" as no data are being transmitted until the fiber is "lit."

Network providers offer two commercial approaches:

- Lit fiber customers share a system that is lit by a network operator and its transmission equipment.
- Dark fiber provides a private network with dedicated bandwidth that customers "light" by operating their respective equipment, and it allows customers a secure, scalable, customized network without capacity constraints imposed by a "lit" fiber operator.

The competitive landscape is characterized by the barriers to entry created through large capital investments, first-mover advantages, exclusivity of permitting and rights and low marginal costs of adding customers. Additionally, the majority of necessary capex has already been spent to deploy the assets and there are limited operating expenses, which allows for low operating leverage and stable cash flows.

Fiber Network Assets – MPL Multiples

Rating Category	High	Low
AAAsf	—	—
AAsf	—	—
Asf	9.00	6.00
BBBsf	10.25	6.75
BBB–sf	10.75	7.25
BBsf	12.25	8.25
Bsf	14.00	9.50

Source: Fitch Ratings

Credit Risk Factors

Fitch's selection of MPL Multiples are influenced by collateral characteristics and structural features. Applicable CRFs include:

- technology type (strand count, glass versus copper);
- operational requirements and operator dependence (dark versus lit, long-term contracts versus price volume risk);
- depth and demand of market (data center count and capacity);
- deployed fiber network capacity for anticipated growth;
- barriers to entry, threat of alternatives;
- investment-grade contracts/payors;
- portfolio diversity, 10 largest customers % of pool;
- WA remaining contract term;
- duration of agreements that grant provider access rights of way, renewal options;
- expected capital investments over extended loan term (expansion and replacement capex);
- remaining useful life, potential limitations;
- marginal cost of adding new customers;
- operating expense margins;
- contracts renewal rates;
- expected churn; and
- transaction structure.

FNCF Considerations

Adjustments to determine FNCF are similar to wireless towers — technology type (fiber versus copper), contract duration and investment grade/non-investment grade ratings.

Minimum management fees of 5%–10% are common; operating expenses and capex assumptions are adjusted based on historical performance and industry expert opinions.

The presence and materiality of the primary credit risk factors will frame the cash flow adjustments. These adjustments will be disclosed in Fitch's ratings commentary.

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